Sustainability: Elusive or Illusion?

Wise Environmental Intervention

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Author's Foreword

For a few years, I was concerned that I was becoming cynical of the actions of agricultural science and its application around the world. Then I realised that, in fact, my unease was the result of a rising consciousness of the confusion surrounding science as it related to sustainability. I then saw that I could, perhaps, make a greater contribution by highlighting this context than by adding to the confusion. My perspective had been reinforced by a general tiredness with the righteous repetition of both development advocates and scientists – with both of whom I had long been one – that increased trade, technology and international aid would forestall environmental and social collapse. As I came to see that self-interest underpinned major policy and actions in the sphere, I further questioned our evangelical eagerness in expanding the very values that were apparently failing at least some in our society.

So, what are we in the West doing wrong, for surely our hearts are in the right place? Well – it seems to me that our hearts may not be so well located and that our heads are in the clouds! While we preach harmony with the environment, we continue to advocate the model of constant progress, for sustenance of our very financial base requires it – and we treat environmental matters as 'problems' to be 'solved' by research and development programs. As I came to realise that we can only treat ourselves as part of nature, and that our behaviour in this and other ways must therefore be natural, it seemed that a fatalistic conclusion could be reached - things can only be as they are. If we are animals with four basic limbic responses of feeding, fighting, fleeing and reproducing, then why should our institutions and edifices be seen in any other light? We seek to ensure an excess of

food for ourselves, enshrine fighting within competitive modes in which we retain an advantage, and flee challenging alternatives to our worldviews as we seek to reproduce our socio-economic system across the globe. But such so called 'realism' is in fact not real, for it ignores our human consciousness – a potential we seldom stop to consider.

Before leaving this unpopular train of thought, let me cast it in terms of 'enlightened self-interest', which is sometimes seen as a workable context for our economic development. According to this argument, if we look after ourselves by judiciously helping others, it is then up to them to look after themselves. A modern example is the free provision of patented genetic material to poor countries, which is said to help them while assisting to create a future market for the owners of the patents. This sounds like a win-win game - until we consider the values of such factors as; the poor country as the original source of the genetic material, the shift that accompanies promotion of such products from feeding a family to commercial agriculture with its requirements for finance and markets, and the extreme vulnerability of poorer areas of the world when there is a glitch in markets, politics or weather. Such actions just seem to be the same old undeveloped human behaviour of exploitation over nature including fellow humans that fills our history. Like the Emperor, we have dressed this enlightened self-interest in new clothes, which in our delusory state, we admire as omniscient human development – and yet a young child could tell us that this is but naked greed and ignorance.

Obscuring greed and acting in ignorance of nature may one day be used to classify our era - who knows? It seems that technology has its own life, and while we could perhaps have reasoned that

technologies are morally neutral, we can no longer use this argument to exempt ourselves from ethical decisions – creating an atom bomb proved that. It now seems axiomatic - Achilles' Axiom if you like – that 'a technology once developed will always be employed'. For it is in the employment of technology that we reveal our vulnerability to its unforeseen effects. For this reason, morality in research is more than a simple monitoring of public opinion trends represented as ethics, it is an individual responsibility of each concerned scientist and administrator. And this responsibility extends even further in aid and trade policies that allow continued food deficit to affect up to a million people in a world awash with food, while promoting such technologies as genetic manipulation as a cure for the food shortage. Not only do we routinely accept that anomaly, we do not even acknowledge some of the most glaring causes of inequity in access to food are subsidy-encouraged surpluses dumped below cost, and trade barriers that favour rich countries in their exporting of industries with high human and environmental costs. Yet I am not arguing against technology in general or even such specific accomplishments as genetically modified foods.

How can we fathom the depths of international equity within a paradigm of self-interest? I delete the descriptive 'enlightened' from the term because I see it more as 'endarkening' – like chambers in a Dungeons and Dragons game in which we must deal with each new danger as it confronts us, with no time for rest let alone contemplative reflection. If there is a player of the game, perhaps it is a super-administrator who sees a slightly wider picture, but even the perspective of such a person is narrowed by the game until all events seem random – the best that can be done is to practice within the rules of the game, gaining higher levels of skill in something that is removed form

reality. Such may be modern research; but being human may not be a game, and as scientists and administrators we would do well to reflect on the real possibility that the dungeons and dragons that define our limitations are inside us – and so is the answer to the continuous battles that we instigate.

All of the above thoughts come from notes taken in moments of concern during conferences promoting more-of-the-same sustainability research 'and development'. I saw them as a suitable foreword to this collection of papers that trace my thoughts on such matters over a period of personal transition. These thoughts do not represent a new paradigm, but they may hint at the wider perspective that arises from stepping back from the hectic everyday roles of scientists and administrators, and the benefits of reflection on the real purpose of life, or at least, as a context for our actions. Such thoughts are amplified in a more structured manner in the chapters of this collation. And as such thoughts congealed into patterns for me, so may they for you, offer some insight into the overall question as to whether sustainability is elusive, or an illusion?

LF

Chapter 1

Stepping Back to Survey the Landscape

to reflect how all things change yet last
is to measure life anew

Sustainability of the environment implies both wishful thinking and ignorance – ignorance of the reality that natural systems are complex and unfathomable by scientists, and that repetition of research outputs depend on repetition of initial and all subsequent conditions. Scientific insights provide knowledge, but it is partial in most cases, and when applied is often subject to conflicting objectives, which in turn produce conditions that affect outcomes - thus our best efforts to predict natural outcomes are usually flawed. We further display our ignorance in seeking social sustainability while we behave inequitably towards groups other than 'us' and invoke spurious reasoning to justify further research. The effect of ignorant self-interest is played out daily in our largest intervention in the natural environment – agriculture, which is why agriculture provides perhaps the best model for consideration of the ideal of sustainability.

We live in an illusory world. So say the wise of all great civilizations. Is our obsession with forestalling change by invoking the new morality of sustainability conducted within our illusory world? And what do these terms mean anyway? The following chapters consider these matters from everyday perspectives and present an optimistic conclusion about our

unused capacities to understand and interact wisely with nature. The words 'sustainability' and 'wisdom' are referred to throughout this book. Yet, neither shares common meanings across different interest groups particularly in our New Age exploration of inner space.

So what do these two words mean? Well, according to the Oxford Dictionary, 'sustainable' may be defined as; 'capable of being borne or endured; supportable, bearable', or 'capable of being upheld or defended; maintainable' (in terms of an opinion), or 'capable of being maintained at a certain rate or level' (in such forms as 'sustainable economic growth' and 'sustainable yield'). It is from this last definition that 'sustainability' is derived. It is the misuse, both deliberate and in ignorance, of this last usage that I examine in this book as either 'sustainability' or 'sustainable agriculture'.

Wisdom is even more difficult to define, not the least because the vast majority of us are not sufficiently wise enough to understand it! Most definitions dwell on the relative 'wise-ness' of persons, but the concept to which I refer as wisdom transcends ordinary discourse. We should therefore not focus on the common lexical presentation of the 'capacity of judging rightly in matters relating to life and conduct'. Subsidiary dictionary definitions provide an inkling of the meaning that I intend. For example, wisdom is used 'as one of the manifestations of the divine nature … '; as 'knowledge of a high or abstruse kind, enlightenment …'; as 'wise discourse or teaching … ', and 'in the titles of two books of the Apocrypha …'.

I suppose that from such uses of 'wisdom' came its use for translation of the classical Indian concept that is defined in later

chapters as an expression of insight about the nature of transcendent reality. At first glance this might appear unscientific and certainly unconventional; however, I hope that the approach is self-explanatory through the book. I also hope that the wisdom of merging rational theories of science with such insights will become self-evident in a wiser form of environmental intervention.

Having introduced the words let me briefly introduce the work.

The book takes a broad view of that grail of sustainability that pervades the supporting rhetoric of Western-influenced education and commerce, and suggests that, as ever, the grail may only be grasped by the pure of heart. To the rational Western-influenced mind, this implies a widening of the concept of mind beyond the one organ of the brain to embrace the heart, and a re-evaluation of the source of scientific insights and the origins of human knowledge. This line of thinking would consider the historical interrelationships across the Asian region and their influence on the world at large as having long been downplayed, especially with respect to the central aspect of individual potential. In fact, a common heritage between East and West exists and is deeper than such physical factors as mathematical concepts and philosophy divorced of its metaphysics, as has evolved in the West since the Renaissance.

The heritage itself relates to humans' relationships with themselves, each other, and nature – and it is this that can now inform us of the Achilles' heel of our modern science and society. Our reliance on successive interventions in the natural environment seems to be related to our separation of science from deeper understandings of life – a simple explanation that is

unpopular in an era of our continued dominance and apparent success. Yet, as the monk-scholar William of Ockham postulated in what science paraphrases as 'Ockham's Razor', 'the simplest explanation is most likely correct'.

If we review the history of human knowledge, we discover that, in enabling civilisation, agriculture also gave rise to advances in spiritual understanding in the form of goddesses, or 'earth mothers' in the modern day parlance that seeks to broaden our view of nature. It also seems that this association of agriculture with goddesses was trounced by the gods of the unsettled herders who were more militarily oriented and assumed dominance of the early agropolises. Having inherited this male-god tradition in the West, we have refined it to produce such innovations as chemical 'fertiliser', thereby usurping the original meaning of fecundity in the original goddess conceptions of agriculture. I am not offering some veiled apology for feminism – far from it – rather I seek to recognize our relationship with nature as essential to discussions about agriculture and sustainability. This renders modern technological interventions to be both a cause and a symptom of environmental decline – yet the technology itself is said to be amoral, for it is we who apply it for specific ends that determine its morality. We are usually concerned first with our own comfort, and as environmental decline now appears to impact on our comfort, we have become concerned that we may not be able to continue to avail ourselves of its products from our past and current practices. Thus we have created a new approach, which we invoke under the motherhood term, 'sustainability'.

Our intent remains that of sustaining our preferred approach to such environmental interventions as agriculture as one more

form of global business. This is nothing new - dominant powers have always found clever means to exploit weaker groups under the rubric of what we now call business. And as we all know, there is no point trying to change human nature. But is that really true? Surely we seek to change other aspects of nature, admittedly to suit ourselves rather than nature as a whole, so why not look at changing our human nature? Why not look at the full breadth of human knowledge to consider this or any other issue? It is true that modern agriculture faces issues of rising population and food production, and that this challenge produces additional concern that further degradation of the natural environment will decrease our quality of life in the West. But can this just be considered in isolation from our basic human nature? We define unsustainable agricultural development leads as that which, among other things, produces such outcomes as soil degradation, chemical contamination, forest destruction, and reductions in biodiversity. And we know, deep down, that sustainable agriculture is beyond our grasp, despite our contrary rhetoric. In this way, we create our own cognitive dissociation – most commonly referred to as 'stress'. But do we actually consider a more integrated approach to life as part of sustainability and agricultural development activities?

I think the answer to the questions is 'no, we do not consider all human knowledge and potential in our research'. If we did, our approach to the environmental sciences such as agriculture would not ignore the long extant and practical alternatives to intensive commercial agriculture. We know of various low-input and ecologically considerate forms of food production that incorporate such human values as self-reliance and psychological health.

In the poorer countries it seems naive to consider agriculture solely as a business, when its rural base and occupation affords social security, and acts as a repository of cultural values, while reducing urban migration. Yet we, through our policies and those we have influenced, ignore this fact as we seek to replicate the Western economic model for agriculture in less-developed countries. Meanwhile at home, we anguish over such moral challenges as genetically modified organisms (GMOs) within the reduced perspective of our own society, and profitability. The technologies themselves may be morally neutral, but really it is the intent of its owners and of all involved in their development and purveyance that determines their effects and hence their morality – and thereby implicates we scientists and the research in which we allow ourselves to engage.

When we seek to 'sustain' research projects such as GM foods, we readily invoke third-world needs in order to emphasize the benefits of the technology – such as meeting future food production needs - and then ignore payment for the third-world sources of genetic material. As regulatory frameworks, ownership of genetic material and trade barriers appear to restrict the potential of such technologies to facilitate equity in food availability, ethical considerations cannot but be part of the scientists' realm.

Science may be amoral, but the way that it is applied now reflects the partiality to which we, its practitioners, have become party as profit-oriented funding assumes a role previously accepted by government. If we cannot argue about the source of funds as good or bad in their own right, we can ensure that we are aware of the intentions and likely application of technologies, in the same manner that munitions researchers can readily infer the

immoral intent of their products – but we environmental scientists seem to retain a past worldview that somehow we are aloof from moral issues, as if paternalistic government continued its influence over research funding. It does not, and hasn't for decades.

Whether we need increased food production in the world for future projected populations, and whether this relies on such technologies as GMOs, seems to be a secondary issue to that of ensuring the basic rights of all people – and perhaps 'protecting' the natural environment, though we usually do not know what that means. If we continue to omit such actions of self-sufficient and small-scale agriculture and equitable global purchasing arrangements, are we really sustaining anything in the long run? Perhaps we can re-view the broad picture by considering the gifts of known technology – there seems to be enough food to go around now – perhaps we no longer have to base our decisions on assumptions of scarcity. If so, we would be correct to claim that acting in a sustainable manner is the answer to most environmental questions. But the way we invoke the god of sustainability bears an uncanny resemblance to most such theological invocations, where lip service and literalism quickly overtake conceptual terms and their metaphorical intentions.

Sustainable environmental development in fact implies something akin to acting within the spirit in nature, a concept that is more easily examined in modern and ancient Asia than the modern West. Without consciously orienting actions to 'sustainability', traditional environmental approaches to an activity such as agriculture in Asia seem to accommodate such values as leisure, thrift, and preservation of sacred reserves within everyday actions, sometimes enshrined in mainstream

religion. However, rapid population increases often force farmers into more environmentally sensitive areas, especially when international development policies encourage adoption of profit-oriented economic development in place of traditional systems. And of course, such high-technology agriculture is also promised to be 'sustainable' according to the development rhetoric.

How can we reconcile these apparently opposing approaches to sustainability? Is it possible to find a sustainable approach within profit-oriented agribusiness of the West and increasingly Asia, or can it only exist within traditional societies – and if the answer trends towards the latter, how do we explain the ecological decline under some stable-population agricultural systems of the past?

One means of examining sustainability is to consider technology in the context of ancient wisdom. This requires a consideration of both the rationality that underpins the technological understandings of science, and the insights of the wise, and while these often differ, they also sometimes agree. Our present treadmill of uncertain attempts to sustain outputs by constant technological innovation contrasts with the wise observation that each of our thoughts and actions leads to conditions that affect subsequent events. Expressed more actively, this implies that primary motivations affect overall outcomes, and in so far as large-scale and primarily profit-based agriculture and other activities have an overt aim, we should not expect, or pretend, that these can be environmentally sustainable. Such a conclusion renders many institutional approaches to sustainability misguided, at best.

Please do not be surprised by the coincidence that this short introduction, in true Asian style, ends where it began, with the ancient wisdom of Asia; for the small-holder agriculture that has ever been present in Asia preserves something of what we seek. The combined ancient wisdom suggests, for example; that food 'needs' should not be treated in the same manner as non-essential 'wants' in life that ultimately derive from greed, that our motives or intentions determine the conditions that affect subsequent events in the sophisticated (as opposed to the popular sophistic) conceptions of karma, and that striving for stability within a reality of the impermanence of all things will only produce frustration. Honesty is a hallmark of science and the scientific method, and in all honesty, we must acknowledge that, just as a partial truth is dishonest, we cannot claim to be seeking sustainability when we narrow our perspective to one aspect of one field of endeavour separated from the whole of nature.

This is not just 'motherhood stuff' – for presentation of sustainability in such terms is not just misleading, but also disparages both motherhood and sustainability. It produces the general thought that sustainability is 'a good thing that we all support' while adding, under our breath, 'but we all know that in real world we must first seek short-term profit'. 'Seek ye first the kingdom of profit and all things shall be added unto you' teaches our secular theology, and this seems the very approach of most of our environmental actions and applied science. We have forgotten that science once referred to the combined knowledge of humans, and that even within our own culture, the bridge between *scientia* and *sapientia* was once acknowledged as the source of practical wisdom for the 'real world'.

If we are to be serious about such matters as sustainability, we will need far more insight into the nature of reality. Yet it seems that we ever move away from this, both in terms of our motivations and excesses within consumer and capitalistic approaches, and in terms of our misplaced faith in being able to replicate in real world situations discoveries proved under artificial conditions. It is indeed time to 'take time' to step back and consider the landscape of such functional acts as agriculture - our most widespread environmental intervention. What is the net benefit of a rice crop genetically modified through addition of wheat alleles to produce slightly more grain if it also produces allergenic expressions from gluten and narrows the gene pool for natural disease resistance across all cereals? What use is a blue rose, specially bred to expand the floral spectral range, when the essence of its rose-ness is lost?

Take your time to smell the rose
and in your lab you'll ne'er suppose
that larger blooms hold pure intent
unless possessed of natural scent.

To view food production from a technology-based Western perspective is to omit the overwhelming majority of the world's agriculture – it is to negate the natural scent of subsistence farming and the integral role of farming with life. Such was my concern after more than a quarter-century's association with Asian agriculture, when I was invited to write on the commonality of agricultural heritage in the region – a task that heightened my realisation of the environmental wisdom derived from agriculture and from which we, in the West, seem to have largely separated ourselves. Chapter 2 therefore considers our unacknowledged debt to Asia.

Chapter 2

The Unacknowledged Debt to Asia: A Different Agricultural and Environmental Reality

see all man's thoughts as loaned from past –
for no false gods renew!

To seek a wider agricultural heritage in our hemisphere, we must at least consider Asia. As civilisation supported by agriculture emerged, so did new insights into our relationship with ourselves and with nature. These early cities were the melting pot that blended sedentary herding and hunting cultures and their aggressive gods with settled agricultural communities and their nurturing gods and cyclical rhythms. Both elements continue in the myths of great world religions, and are reflected in modern issues of dominance and environmental concern. Common technologies, plants and animals, and environmental problems may be cited as evidence of historical interrelationships across the region, but the common heritage in fact is deeper than such physical factors, for heritage itself relates to human relationships. The development of agriculture at different sites suggests a parallel evolution supplemented by diffusion or transfer of technologies along with understanding of life. However, today the contrast between less-(Eastern) and more-developed (Western) countries may be portrayed in terms of environmental attitudes. With agriculture practiced the world over, we must look within its practices to find differing attitudes to nature, and we find in those sections of Asia that are as yet uninfluenced by Western approaches that an inherent attitude of working within nature is retained. Nurture, care, sensitivity,

acceptance of change and so forth form part of agriculture in these situations, in contrast with the attitude of modifying any inconvenient aspect of the environment that pervades modern agriculture and which we promote across the globe.

Agriculture's Legacy

The emergence of agriculture may be simplified to show it as the source of civilisation, major religions, and the innovative characteristics that we value about being human. Agriculture did not begin at any single point or time; it was a simple, innocuous, and incremental human modification of the natural environment, which produced exceptional human benefits. The stability created by such simple innovations as mud barriers to retard receding flood waters allowed large and stable settlements, food surpluses, differentiation of labour between persons and seasons,[1] and also fostered development of the unique human facility of spiritual understanding. Agriculture underpinned all this, and continues to do so, by a three-fold approach to environmental manipulation.

At its best, agriculture requires the sensitive and minimal modification of the natural environment to ensure a sustainable output. It has followed the three common paths:

- seeking to increase the availability of a natural resource such as water, soil, or nutrients, and the availability of feeds for animals, and to reduce crop and animal losses by controlling predators, diseases or weeds;

[1] L. Falvey (2000a)

- managing the evolution of both plants and animals by selecting those genotypes which suit human needs and the environments in which the plants and animals are to be raised, and where genetic manipulation through breeding is not feasible, introducing foreign species; and
- improving the efficiency of management techniques in the areas mentioned above in order to gain higher efficiencies of utilisation of limiting resources.[2]

It is within this requirement of agriculture to modify the natural environment that a common legacy may be sought, which can further inform our question as to whether sustainability is simply elusive, or is in fact illusory.

Approaches to modification of the environment for agriculture have varied between cultures as is amplified elsewhere in the text, and may be summarised as follows. The Western model for agricultural development has been based on competition, technology and financial efficiency within the overall Western value system, which is necessarily derived from, or today at least influenced by, Christianity. Much of Asia has a different cultural history, which emphasises community, security, and integration with other values; such commonalities transcend different agricultural origins across Asia.

Agricultural Origins

The agricultures of India and Southeast Asia do not appear to share common origins, but from the first millennium BCE until about 1500 CE, Indian influence in key areas of Southeast Asia fostered common views and means of communicating about

[2] L. Falvey (1996)

agriculture and nature. The different origins are summarised from conventional historical views in the following; however, a passing reference to Vavilov might first be expected at this point.

Probably the leading plant geographer of the 20th century, Vavilov posited that geographical regions with the maximum diversity within a species are likely to be that species' centre of origin, because variation increases with the time that a plant had been in a location.[3] His explorations led to his definition of eight centres of origin for crops, of which the centres 2, 2a, and 3 indicated in Figure 1 are important to this discussion. Crops concerned included apple, banana, black pepper, breadfruit, carrot, chickpea, citron, coconut, cotton, cucumber, grape, mango, onion, pea, pear, radish, rice, safflower, sesame, spinach, sugarcane, and yam. An overlapping listing of rice and some other crops, and the 2-2a appellation indicate some uncertainty in the proposition of independent origins, and may therefore indicate very early human contact between Indian and Southeast Asia. However, it could also challenge Vavilov's assumption that genetic diversity was mainly influence by time; for example, a crop introduced to another area that had indigenous variations of the species could accelerate diversity through hybridisation. In any case, such uncertainty is less critical to our current concern, and we expect more useful data from DNA profiles currently being assembled. But it is the intimate association of culture with agriculture that concerns us in our quest to understand historical commonalities and differences in attitudes to the natural environment.

[3] N. Vavilov (1926)

India: From such settlements as the Indus Plains and Baluchistan hills, Indian agriculture is known to date from at least 7,000 BCE, probably beginning with barley and wheat cultivation and sheep and goat herding, and by 5,000 BCE involving domesticated cattle. Such settlements expanded across the Indus system from about 3,500 BCE and eventually to the floodplains. Thereafter, wider agricultural settlements to the southeast seem to have arisen independent of the embryonic Indian cities.[4] Subsequent development in India relied on its secure agricultural base, which produced the urban Harappan culture prior to immigrant Aryan pastoralists assuming dominance and expanding agriculture in conjunction with cattle grazing as they oversaw the great Vedic culture. The coincident emergence of higher levels of human consciousness provided not only records of these agricultural developments, but also retained and explained the basis for cultural awareness of human relationships with nature.[5] At least from the Vedic age, agricultural terms such as 'krish' (plough) are known to have been employed from Iran to India;[6] however, their subsequent extension into Southeast Asia, such as the related Thai word for agriculture 'kaset' (□□□□□), derive from a later period of Indian influence through the region that ultimately created the critical common heritage.

The early territorial states (600-332 BCE) that followed the Vedic Age were structured around landowners, slaves and labourers within a caste system and expanded trade of agricultural and other commodities. The period is referred to in Buddhist and Jain documents, and influences the moral guidelines they contain; for example, the ideal governance systems of Buddhism assume a

[4] B. Allchin (1982)
[5] R. Majumdar (1952)
[6] E. Rapson (1922)

moral and aware ruler who lives an exemplary life as an example to those born into lower status within the society.[7] The Greeks were also aware of the empires being created in India in this era, some of which aligned religious evolution with governance, such as documented during the Buddhist kingdom of Ashoka.[8] The small kingdoms that followed (200 BCE – 300 CE) included Greek rulers who adopted Indian religions, such as Menander or Milinda, who appears to have converted to Buddhism around 150 BCE. Literature of the period indicates that the majority indigenous populace gradually adopted Aryan culture as they shifted from tribal to peasant economies that served the expansion of agriculture with the rising maritime trade controlled by ruling families.[9]

The Classical Age (300-650 CE) saw rising international contact, such as that of the Chinese pilgrim Fa Hsien in his search for Buddhist manuscripts. It also produced advances in astronomy, medicine, and commerce, and was the principal form of Indianisation in Southeast Asia. Indian influence was greatest along trading routes such as the Straits of Melaka and the Srivijaya kingdom of Sumatra, which in turn influenced surrounding areas including peninsula Thailand. Agricultural technology followed contacts, as did religious systems, and the combination represents an essential shared heritage.

Southeast Asia: Classical Indian influence entered Southeast Asia through Brahman culture in Sumatra, Java, and Kalimantan, notwithstanding the subsequent replacement of Hinduism and Buddhism by Islam. Indianised kingdoms reflecting Indian

[7] L. Gabaude (1990) pp.211-229
[8] S. Tambiah (1976) Page 27.
[9] D. Kosambi (1965)

aesthetics, writing forms, and god-king-ruler concepts emerged in Champa (Vietnam) and Angkor (Cambodia) and spread to other parts of Indo-China with Hinduism and Buddhism, and to Ayutthaya where it expanded the previously introduced Buddhism. Of course, agriculture had developed in Southeast Asia long before this era.

Neolithic sites have been found in all regions of Southeast Asia representing periods from 4,000 to 1,000 BCE. The relatively rapid dispersal of agriculture through the archipelago from Taiwan to Timor seems to have accompanied the migration of Austronesian language speakers about 3,000 BCE. However, archaeological investigation has been limited, the most detailed being within Thailand. Agriculture appears to have evolved from hunting and gathering societies where suitable indigenous plants existed – in southern China with rice, and the New Guinea highlands with root crops, for example. However, over the majority of the area of Southeast Asia, agriculture seems to have been introduced by immigrants as they sought new and suitable environments for rice technology.

The success story of the region, rice was taken to new swampy and alluvial areas in preference to laborious construction of artificial flooded conditions. Taro often followed this expansion of rice. As rice spread southward from China, its utility declined due to its photoperiodic nature, severely limiting yields in the equatorial regions of Malaysia and Indonesia until adapted varieties emerged about one millennium later; it did not spread to the Pacific islands until even later.[10]

[10] P. Bellwood (1980)

The final centuries BCE saw coastal Southeast Asia enter the metal era in a form directly related to India. This is a critical period for our discussion, even though adoption of Indian form by local elites may not have penetrated far into local agricultural communities in the first instance. Early Indian contact is evident in Sumatra, the staging port between India and the Funan economy of the Mekong delta. Its centre in Palermbang grew, reflecting its selection not just as a convenience of transit, but also as a fertile rice growing area - indeed, local legend holds that the site was selected after comparing the silt loads of alternative river mouths.[11] The Srivijaya kingdom that resulted from reliable rice surpluses attracted Indian traders who influenced areas into southern Thailand and across Java.

Indian culture provided Southeast Asian rulers with a means of demonstrating their social status. Courtly accoutrements, edifices and religions were adopted from India, although not without modification to local mores. Thus the caste system was apparently never fully implemented in Hindu Southeast Asia, and Indian gods were ascribed powers alongside continuing local gods. In agricultural terms, the complex and highly successful Javanese irrigation management systems were largely unaffected by local rulers' adoption of Indian ways, although they appear to have been used to consolidate influence over the coalitions of water management groups that represented a ruler's domain. Labour for temple construction was necessarily drawn from the agricultural producers who developed high skills and appear to have not had to compromise seasonal farming operations. Temples became the focus of agricultural marketing, and thus labour may well have been factored into transactions.

[11] K. Hall (1992)

The essentially ceremonial role of rulers encouraged further orientation to India for art and religio-cultural development, including the sponsoring of Buddhist monks from the great Indian university of Nalanda to Srivijaya (Sumatra).

Sea trade routes and the narrow land connection across the Isthmus of Kra in Thailand shaped development of southern Thailand. Its agriculture combined technologies from Indian-influenced Java and Sumatra, and India itself, as well as from extensive trading connections with China. Technologies emanating from Srivijaya are still evident today, and differ from the rest of Thailand – for example, a small rice-harvesting knife manipulated within the palm of the hand is used to cut ripened racemes rather than the usual Thai scything of rice stalks.

Indian influence is also evident in the Vietnamese Cham kingdom as a means of enhancing a leader's status, although Chinese influence was ultimately greater. Elsewhere in Southeast Asia however, the overwhelming influence was Indian, although not from migration or domination by Indian groups, but more as ready adoption of Indian ways. Traders were the vehicle of influence and came mainly from Gujarat, Malabar and Coromandel, and Bengal. Trade and its pervasive Indian influence continued until the traffic was usurped by European colonial powers.

Initially limited to the elite, Indian influence reached to the agricultural communities through the loose separation of the masses from rulers in the Southeast Asian kingdoms, and thus variously influenced religious belief and rites. Adoption of Indian religions introduced teachings and views of agriculture, which were related to perspectives of the great era of Indian

religious consciousness about 2,500 years ago. In that context, agriculture was simply an accepted critical activity of society to be performed attentively and with respect for the environment, which was referred to as part of truth or laws of nature.[12] Such perceptions built on earlier understandings of nature and survived long-term contact with the West, which by this time was beginning its flirtation with technology.

Contact with the West

The common agricultural heritage of Asia is evident in differences from European influenced cultures in fundamental understandings of the context in which agriculture is practiced. Much more than simple differences in perspective, deeply entrenched cultural values in India through Southeast Asia are evident in their resilience over more than 2,000 years in the case of India; in fact, archaeological analyses of Roman pottery and other remnants suggest trading contact with India from around 1,000 BCE.

Interaction was already active by the first two centuries of the Roman Empire through links made by Alexandrian Greeks and Egyptians, Syrians and others. While Indian ships probably did not travel west of the mouth of the Red Sea in this period, it is clear that by 25 BCE the coast-hugging trading vessels of the Romans avoided the Arab states in preference to landing at Barbaricon on the Indus where they sourced Indian, Persian, Tibetan, and Chinese goods. Persians dominated the trade until Augustus coveted the spices, aromatics, and precious stones from Indian ports and entered the trade, leading to an Indian

[12] C. Rhys Davids (1922) Page 203.

embassy to Augustus at Samos in 21 BCE. Trade of the era also included juices, pepper, spikenard, cinnamon, cardamom, ginger, sugar, aloes, cotton, peaches and apricots. India also exported cereals in the form of rice – to east Africa, three breeds of millet – sorghum, spiked millet, and ragi, and wheat – in a two-way trade associated with ship crews. Pliny's writings contain lists of Indian products and prices. From the Roman Empire, India imported metal, coins, and luxury items.[13]

After two centuries of peaceful trade, this form of contact declined with the demise of Rome, and Abyssinians, Arabs and Persians assumed control of the reduced trade. The influence of India on Rome and the West from this period appears to have been significantly underestimated in the Greco-Roman tradition of European history. Nevertheless, Indian-Greek interaction had clearly occurred on such matters as the calendar, astronomy, and art styles, particularly sculpture. Similarly the Jataka stories of experiences in the previous lives of the Buddha, as well as other Indian philosophy, influenced neo-platonic texts, although spiritual aspects of these writings have usually been subordinated in modern rational analyses.

Integrating morality in one's lifestyle and teaching was part of a spiritual understanding advocated in ancient Greece and is quite consistent with Indian spiritual teachings. Abraham quotes that Pythagoras, a contemporary with Buddha in an era of intellectual interaction 'held the soul to be immortal, … that it migrates into kinds of animals, … that events repeat themselves in a cyclical process and nothing is new in an absolute sense and … that one must regard all living beings as kindred'. That 'these are the

[13] E. Warmington (1928)

beliefs that Pythagoras is said to have been the first to introduce into Greece'[14] may imply a source of such ideas in Indian thought. The disjuncture between the eras of such shared insights and their separation in our era further defines the heritage of regions that have retained an understanding of nature different from that of the modern West.

Further indications of deep and long-term interaction may be seen in the congruity of teachings between Christianity and Indian religions, which again may be greater than conventional views allow. Interaction is also indicated in such forms as;

- the obvious mutual influence in sculpture and other art of India and Greece,
- Alexander the Great's wisdom in assigning his leading general to maintain the integrity of a functioning Buddhist community in India where the general lived out his life,
- the known sea and land traffic along trade routes across the regions, and
- the peripatetic scholars who roamed in search of spiritual knowledge, crossing through Greece, the Middle East and the Indian subcontinent.

By the time of Ptolemy, the trading influence of Rome extended into Southeast Asia, where the Malay traders' home is noted in the terms - 'a country of 'Brigands' in South Siam and Kambodia had one emporium called Thipinobaste (Bungpasoi near Bangkok) and one city Zabae, and two other places, while in the Great Gulf were several towns each known as a metropolis.'[15]

[14] Porphyry quoted in R. Abraham (1994) Page.113.
[15] E. Warmington (1928) Page 127.

So, throughout some 2,000 years of contact, cultural separations remained between the West and India and the Southeast Asia that it had influenced. The shorthand used in this chapter for those differences is religion, although variations that are exceptions to this generality are numerous.

Religion, Nature and Agriculture

The Western emphasis of values that it has ascribed to, or interpreted from, the Semitic religions, particularly Christianity and Judaism, has lead to a different understanding of human relationships to the environment than has been common among peoples of Hindu, Buddhist or other Indian religions. The difference between these is amplified in the following paragraphs. However, it is first important to clarify the tenuous distinctions of popular espousals of national religions. Perspectives ascribed to the Semitic religions might be expected to be evident in Islamic states in post-European colonial Asia. In such States, the inherent attitudes toward nature before the arrival Indian influence, which were congruent with and developed by the Indian religions, appear to have survived in countries like Indonesia and Malaysia, while the more remote and less Indian-influenced Philippine Islands seem to have similarly retained some pre-Christian attitudes that differ from those of their erstwhile colonial rulers. Until our time, the relatively low levels of whole-of-society participation in Western technologies may have encouraged retention of ancient values in these countries in a form largely forsaken in the West.

In agriculture, attitudes to nature are an obvious basis for comparison. Food may be produced within an ecosystem with minimal and considerate interference, or it may be produced by

radical and permanent change to the ecosystem. In reality, all agriculture changes the natural ecosystem, and this forms the basis of cultural, or if you like, religious, examination of such an essential human activity.

Western association with Christianity has relied, particularly since the Renaissance and at least until very recently, on a guilt-free dominance of nature including animals. It was understood that man was created with dominion over nature, and this was interpreted, together with desires for constant economic growth, as a licence for exploitation. More recently, environmental concern has caused a reinterpretation of that licence to one of stewardship on behalf of future generations, and indeed concerned theologians now appear to interpret scripture to mean that humans are earthly custodians of nature on behalf of a creator, rather than created to serve their own ends.[16] This last interpretation pays tribute to original texts that share insights found in the Indian religions. However, religion is no longer a primary force of the secular West, and its influence is more clearly seen in terms of the assumed licence of earlier years and the 'enlightened self-interest' approach of institutional environmental approaches.

'Enlightened self-interest' has been a force behind international development agencies accommodating environmental aspects in food production projects, which continue to assume that expansion of intensive technological systems of the West is essential to meet the food demand of rising populations. Expansion of subsistence agriculture, for example, has received less emphasis than introduction of commercial technologies.

[16] J. Moltmann (1985).

Thus cultural values of involvement and care of nature and wide involvement in family food production have been lost in favour of economic efficiencies. Interestingly, these legacies of Western development models do not seem to accrue to Islamic development approaches, thereby emphasising the limits of rhetoric about the negative environmental attitudes of Semitic religions.

In particular, the species specificity of the Western view of self, in religious and scientific terms, shapes its worldview. The conception of self as a sheep, human or other species is self-evident to modern secular persons, and shapes attitudes to other persons, and the environment. Buddhism, as one example of Indian influence in Southeast Asia, takes the approach of seeking to understand the conception of the self and its perpetuation, while the secular view accepts the conception fundamentally. Western environmental ethics focuses on rights of non-human species and eco-systems as an extension of human rights approaches, and founders on anthropomorphic conceptions of rights linked to responsibilities for non-human life forms. Ascribing an intrinsic value to each life form as an extension of that approach mimics the notion of autonomous self. The behavioral change expected of humans relies on self-interest arguments for species preservation being of benefit to humans, now or in a distant future.

This is the advanced Western view; commerce will continue to adhere to earlier views that are based on human rights to dominate nature and all it contains, and international development represents a tension between these forces. Buddhist attitudes towards the environment assume human relations with other species are only represented as inter-relational. It therefore

relies less on rights and more on development of human consciousness for insight of such interdependence at all levels and times, the product of which is an active compassion for all life.[17] This heritage, which I understand may be found in the Indian religions that share similar origins, has become the means of expressing relationships with nature across Indianised Asia, and contrasts with the Western view.

Indian religions have retained an emphasis of the interconnectedness of all life, indeed all matter, as a basis for respectful involvement with nature. From the spirits of trees, places, and animals of so called primitive religions to the insights of the great era of spiritual consciousness in India, an inherent human feeling of spirituality in nature has been retained. This may not appear to be the case among the Westernised elite of modern Asia, yet probably remains so for the other billions of persons. The understanding that humans reach their potential when they maintain a balance in material, psychological and spiritual aspects of their lives, a fundamental insight of ancient India, has been lost in Western approaches.[18] Comparisons on this basis are humbling, as they show the West to be under-developed, as the imbalance of these aspects is obviously greater when one factor is degraded – such as spirituality, and another emphasised – such as material development and its now self-fuelling engine of technology.

The integrated understanding, or at least feeling, of nature is the essential heritage that is shared between India and Southeast Asia and is that which will be the most critical in the coming era. It arises from the earliest forms of agriculture and before, and has

[17] A. Sponberg (Dharmachari Saaramati) (2000)
[18] B. Griffith (1989)

been understood through reflection and insight throughout the ages, which to us implies an acceptance on the basis of faith in such insights. It is difficult for the economic development models to accommodate such a notion, and incidentally explains why sustainable agriculture cannot exist within that model. It also explains how expressions of integrated values can sometimes be misinterpreted as Luddism by Western development advocates. Nevertheless, historical observation suggests that sustainable agriculture relies on stable communities sharing a worldview that includes an ecological perspective, which is commonly expressed as a reverence for all life as sacred.[19] This subject is developed further in Chapter 9.

This difference can be viewed as an accident of history, rather than one of ignorance on the part of the West. To consider the differences that can emerge between an Indian-influenced culture and Western approaches, a short examination follows of Indian influence in Thai agriculture and the concept of basic rights.

'Indianised' Agriculture

The example of Buddhism and Thailand is presented here simply because I am familiar with it; the following paragraphs are summarised from a recent book on Thai Agriculture,[20] extracts of which have been variously published;[21] the example is amplified in Chapter 8. Other examples can readily be found throughout the region. The Thai experience includes a range of alternatives to intensive agriculture, and leads toward association with

[19] M. Jackson (2002)
[20] L. Falvey (2000a)
[21] L. Falvey (2001a), (2001b), (2001c), (2001d), (2001e), (2000b), (2000c)

spiritual values that seem to have been omitted in the adoption of modern agriculture.

Self-Sufficiency: Alternative agriculture is associated with low input and ecologically considerate forms of food production that incorporate essential human values including self-reliance, healthy food, and some income.[22]. However, it is often a Western concept, and as its name implies, concerns alternatives to intensive commercial agriculture. In Thailand, various 'alternatives' have been tried, but the most appropriate must be traditional approaches modified cautiously. Alternatives considered include; the Japanese Fukuoaka farming system, the Kyusei Nature Farming system,[23] permaculture,[24] a symbiotic agri-aqua-culture system utilizing reduced levels of industrial fertilizers and pesticides,[25] 'organic' farming,[26] and Nature Farming without deliberate killing of pests.[27] Another alternative of reducing dependence on chemicals, credit, and forest encroachment accepts lower yields and leads to consideration of simply producing one's own family food in an integrated farming system, which is described in Thailand as one element of self-sufficiency.[28] These are discussed in more detail in Chapter 8, and may be considered representative of modern acknowledgement of the rights of both humans and nature in the earliest religious codes of India.

[22] T. Udagawa (1993)
[23] Y. Matsumoto (1993)
[24] B. Mollison (1988)
[25] K. Wetchaguran (1980)
[26] H. Smith (1969)
[27] M. Fukushima (1999)
[28] Wasi, Prawase (1998)

Rights: Human rights to food are internationally espoused in theory while denied in fact through such unfortunate acts as occur in ethnic conflicts, and more subtly though misplaced optimism in governance and legal bases, and the 'market failure' that arises when competitive economic systems fail to deliver equitable outcomes. Environmental compromise arising from agriculture can be conceived as a consequence of poverty induced by global forces, as well as population pressure, which itself may arise from inequitable access to knowledge.

The 'basic needs' approach of international development appears to address rights, to an extent. However, Indian-derived thought, which conceives the right to eat as the same as the right to breathe, is more fundamental than paternal governance schemes. The basic needs of food, clothes, shelter and health care are drawn from at least 2,500 year-old Indian insights into human life, and directly address the essential development questions of equity, stability, and happiness. This is more far-reaching than the Universal Declaration of Human Rights, Article 25(1) which states that 'everyone has the right to a standard of living adequate for the health and well-being of himself and his family, including food'. Critical in themselves, these moral guidelines of basic rights derive from agriculture's success in supporting the societies that developed such insights – now an irony of history where 'progress' is alienating an increasing proportion of the poor from food production.

The agri-history of India explains the development of agriculture, which allowed sophisticated culture and civilization to emerge. The ability to hoard grain, destroy crops, and create a social hierarchy led to military expansionism, as well as intellectual and religious development. Intellectual, and

particularly spiritual, insights of nature and humans indicated the benefit of moral codes, at one level for social stability, and at another for spiritual development, which in turn also produced stability.[29]

The issue of basic rights in agriculture was recently recognized through the award of the Nobel Prize for Economics to Amrita Sen – and it does not seem to be coincidental that Dr. Sen is steeped in Indian thought. His conclusions that famine is associated with denial of rights to food production through inequitable economic and social policies[30] incorporates the ancient wisdom that individuals first need to be assured of their ability to provide food for their families before other sophistications can be introduced.

In addition to the rights of humans, the rights of nature, long acknowledged in peasant rituals and beliefs, are confirmed in insights of the inter-related nature of all things in a manner understood as ecology by some, and as something deeper by others. Acknowledgement of these rights is re-emerging in Western consciousness[31] but has not penetrated development practice and remains separated from spiritual awareness, in contrast to the retention of such values in the Indian-influenced world. This common heritage differs from the 'introduction' of environmental care into projects. However, the global expansion of materialist values is eroding Asia's primary heritage – spiritual connectedness expressed here in agricultural terms; what is interpreted as successful social development to a Western-influenced government department has been touchingly

[29] T. Moore (2000)
[30] A. Sen (1982)
[31] R. Nash (1989)

described as a usurping of the power of local spirits by a community aware of the unseen aspects of its environment.[32]

The rights of people and nature, and an orientation to self-sufficiency that represents a common heritage of India and Southeast Asia differs from the secular approaches of Western-influenced nations and development agencies.

Secular Approaches

As the main source of modern technology has been the West, its separation of natural science from religion over hundreds of years has influenced the moral position of technology. Weakening influence of moral authority has revealed a relative morality emerging in Western personal life with society being governed by laws that similarly are reinterpreted as morality shifts.[33] Through the period that this has occurred, the concept of stability has become associated with material comfort and the rule of law, with obvious material success. However, success is less evident in terms of non-material development, including psychological and spiritual aspects.[34] For example, pressures to treat food as a traded commodity conflict with the basic right of all humans to produce food. More balanced approaches as are implied by Indian thought, while usually unthinkingly dismissed as impractical, offer the alternative sequential paradigm of food being produced for home use, sharing and sale of any surplus, with income applied to beneficial outcomes in that community.

[32] R. Lando (1983)
[33] R. Goss (1997) Page 292-311.
[34] B. Griffiths (1989)

A community might be defined as a mutually beneficial network of interdependent persons sharing resources essential to the formation and sustenance of that network. In those terms, past separation from community approaches and traditional law in the West may explain the failure of development attempts to 'form', rather than acknowledge, communities. Secular actions flowing from Hobbes' 17th century rejection of humans as naturally social beings have developed into respect for the pursuit of personal interests. This in turn requires regulation of human individuality otherwise ungoverned by community moral codes. The concerns of communities, such as kinship, familial groupings, protection of offspring, preservation of lineage, and belief in the strength of the community against external dangers, contrast with national governance structures that assume homogenization of culture, rights, responsibilities, and lifestyles.[35] To require that poor country farmers aspire to operate as individuals producing cash crops for income from which inputs, credit, and farm equipment can be paid before family food is purchased, acts against social integrity based on the first right of family to the food they produce. One may more easily posit that any organism from a plant (such as the *tattva* described by Jackson[36]) to a human community, or even the universe, has an essence that exceeds the sum of its components within a religio-spiritual understanding imbued through Indian tradition, than one may within a secular or Western approach.

In the relatively poorer nations that concern us here, NGO and related institutional advocacy of traditional approaches to agriculture, and the dispirited farmers earlier induced to trust commercial development promises, highlight the value of such

[35] A. Dyck (1994)
[36] M. Jackson (2002) Page 13.

traditional values as food self-sufficiency as priorities for small farmers. Traditional community-based systems and affinities with the natural environment echo some of the sentiments of the leaders in Western environmental philosophy, who are in turn introducing the debates that will probably modify approaches to development in the longer term. If such similarity of viewpoints continues, agricultural science may well be revealed as having neglected its responsibility to ensure food security and environmental protection when it supported commercial agriculture to the exclusion of self-sufficiency. In my opinion, the lessons of history have not received sufficient acknowledgement in the technological focus of Western agricultural science and international agricultural development.

Western science now talks of environmentally sustainable agriculture, which is often mythologised as traditional peasant agriculture. Where such sustainable systems appear to have existed, integrated social, religious, and economic systems were critical to continuity, and individual motivations included some form of spiritual orientation. In terms of more recent experience, the Green Revolution is a frequently used example of the social and technical success of the Western approach but an environmental failure in its reliance on unsustainable water, chemical, and bio-technical interventions.[37] In fact, within its narrow objectives, it was a success – and the current emphasis of technological solutions to environmental problems of new intensive agriculture is likely to lead to similar technical success. However, the narrow definition of such success is already being challenged – such as Jackson's conclusion that conceptions based on chemical-dependent agriculture 'fail adequately to describe

[37] G. Conway (1997)

and explain the structure and functioning of the natural world' by ignoring or subordinating among other factors, the life of soil, the role of humus and even the movement of liquids.[38] Thus, as highlighted in this chapter, the essential difference between the Indian-influenced cultures and the Green Revolutionary approach is spiritual – and that is the basis of the common agricultural heritage of Asia.

Common Heritage

In this final section of the chapter, I will try to suggest the implications of this common heritage as a critical influence on development. Western environmental approaches are largely reactions to the visible degradation caused by technological agriculture, and in seeking an acceptable basis for the implied costs, has used an 'enlightened self-interest' approach to settle on maintenance of the natural resource base to determine tolerable levels of pollution, erosion, or over-use of any resource. The resultant reduction of the current significant and widespread agricultural pollution is potentially beneficial, but is constrained by such conflicting objectives as yield or profit maximisation and alleviation of the poverty associated with inequitable labour rates across borders. By contrast, the common heritage of acknowledgement of the divine in nature might well have such objectives as family participation in food production, inter-planting and even indeterminate harvesting according to family food demand, or ritual respect for soil, trees and other elements of nature.

[38] M. Jackson (2002) Page 1.

This discussion of a common heritage in agriculture will appear naïve in conventional circles. It implies that technology is better applied to the benefit of all of nature, including humans who may then be freed from the fundamental concerns about food, clothing, shelter, and health. It also implies that small-scale agriculture, with its integration of humans and nature, is a preferred approach to the technologies based on large machines and chemical inputs. But we have structured our societies such that we must continue to rely on the technologically efficient system. However, we need not provide special support for the large-scale commercially orientated sector as its own objectives provide motivation for its continuance; it is the small-scale approach that is respectful of nature embodied in the common heritage that provides a counter to unnecessary expansion of that free-trade commodity approach.

As our secular science encounters 'traditional' technologies of value, it uses these to improve understanding and management of modern agriculture, as is consistent with advance of science.[39] An example for the future may well prove to be improved techniques of rainfall prediction to reach the higher levels of accuracy implied from traditional astro-meteorological theories in India.[40] In this way, the commercial commodity, or secular worldview relies on the 'technological research' cycle to solve production and environmental 'problems' as they impinge on future 'sustained' output, conducted within a faith that all such matters are ultimately controllable by humans. As I argue in Chapter 9,[41] such an approach represents a self-inflicted cycle of

[39] N. Uphoff, M. Esman and A. Krishna (1998)
[40] S. Mishra , V. Dubey and R. Pandey (2002)
[41] L. Falvey (2003)

disappointment, as each 'sustained' scenario encounters 'problems' that the continuing 'technological research' effort must solve in its constant search for an elusive 'sustainable' scenario. Such an approach suggests that we continue to act as if sustainability is able to be hunted down, captured and controlled, although the implications of the foregoing discussion, as expanded in Chapter 9, suggest that it is actually illusory.

The common heritage of Asia provides a basis for re-orienting research to serve small-scale agriculture in its own right, rather than through adaptations of technologies developed for commercial applications. It is a means of balancing the essence of being human through retaining cultural values that are easily eroded by some of the less-positive aspects of globalisation. In terms of agri-history, it allows the reinstatement or the retention of the circle of spiritual understanding that developed with the stability provided by agriculture and that informed agriculturists about means of operating within nature. However, today's reality seems to derive from the relentless advance of global development forces, and it is to these that we now turn in the following Chapter 3.

Chapter 3

Global Development Forces on Agriculture and the Environment

now as gods fall, so surfeit soars,
yet we still exploit the poor,

Rising population and the need for increased food production combine with the global force of dominant cultures to conflict with notions of preservation of natural environments and traditional practices in independent cultures. One constant global force of the past 50 years has been the approach of international development agencies, which in recent times has included the rhetoric of sustainability. Seemingly separate from this, past traditions have recently been ascribed environmental wisdom that is commonly linked to the numerically dominant small-holders of poor-country agriculture. Moral and religious advocacy has raised the issue to wider local attention. This has legitimized practical alternatives to intensive commercial agriculture, which includes various low input and ecologically considerate forms of food production that incorporate such human values as self-reliance and respect for other beings. This development experience and re-consideration of social values can now inform policy for both self-sufficient and commercial agriculture. Adding social to the financial value of agriculture negates conventional 'increasing the cake' economics, which nevertheless seems to be an irresistible global force on development policies. Sustainable development in agriculture, drawing on traditional knowledge and local aspirations as well as international experience, requires overt separation of policies for commercial

agriculture from those for rural poverty alleviation. It also highlights the need for research conducted within an holistic perspective.

Global forces acting on agriculture today are most powerfully reflected through global food demand on the one hand, and international economic development practice on the other. The underpinnings of the economic development models that have supported Western development have been erroneously assumed to exist in Asia. Some policies stemming from that approach may even conflict with environmental and social objectives, while overriding local traditions and culture. Do these different global forces combine in any productive manner, and do they, with the experience of recent decades, provide a new perspective for policies related to sustainable development?

The answer appears to be 'yes - if we accept the inevitability of further population increases, we can draw valuable conclusions to better inform sustainable development policy'. Despite the negative environmental and social impacts of global economic and cultural forces, our experience provides lessons for science and development in regions such as Asia – but this would be based on each approach respecting and learning from the other. This chapter proposes a continuum between globalisation forces, international and national economic development approaches, changing cultural values, and some present-day outcomes. Rather than limit discussion to the usual narrow definitions of economic benefits, the discussion considers the greater issues of poverty and environmental decline. The analysis draws on work from diverse fields; those seeking a wider consideration of the theme in one historical and economic context are directed to a

recent book.[42] Whether sustainability is elusive or illusory would seem to depend on the compatibility of global forces with logical action and natural processes.

Agricultural Environments

All agriculture has modified the natural environment and further modification is likely, even with improved resource regulations and environmental research and education. Preferences for environmentally sensitive traditional forms of agriculture must ultimately acknowledge the realities of a higher global population density. Sustaining productivity in this circumstance is a responsibility beyond agricultural planners or any one group, and involves moral values concerning natural resources and their care, not only on behalf of future generations, but also on behalf of all aspects of nature. If one considers the likely perceptions in such a populace informed at least about inter-generational equity, the probable sustainability of agricultural systems might be represented as in Figure 2, which implies, for example, that low input wet rice culture is more sustainable than other modern intensive cropping systems.

Asian agriculture is diverse. It can be divided physiographically, hydraulically, ethnically, politically, or several other ways including, economically. However, for the purposes of this discussion, some commonality is assumed; social differences are acknowledged later in the chapter.

The agriculture of Asia has been affected by ecological modification following global trends across millennia. These

[42] L. Falvey (2000a)

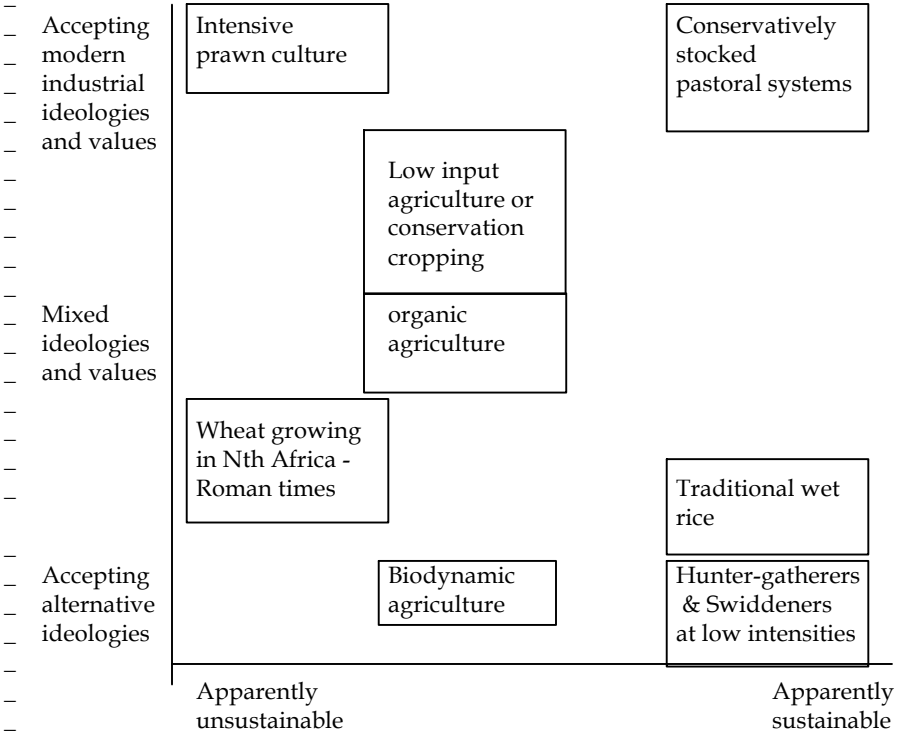
include; genetic manipulation of plants and animals to suit an environment, modification of the environment through such mechanisms as irrigation, and persistent interventions through management techniques as simple as ploughing. Some examples - rice agriculture, soil degradation, chemical and water use, dams, forest encroachment, and biodiversity - serve to introduce the need for an enhanced understanding of agriculture and the environment.

Ancient rice breeding and modification of environments to favour wet rice is one of the world's significant human environmental interventions, probably of greater impact than many present-day issues. Nevertheless, intelligent consideration of such recent impacts as soil degradation, chemical contamination, dams, forest destruction, aquatic plants and animals, greenhouse gas emissions, and reductions in biodiversity, is essential to ongoing improvements to agriculture. In the case of Thailand, for example, intensification of agriculture has degraded soils such that, by 1990, 27 precent were considered to be very seriously eroded, 29 percent severely eroded, and 18 percent moderately eroded, with salinity, organic matter loss, and structural changes rising in incidence.[43] Local rice varieties have reduced from several thousand to a few hundred planted by less than five percent of farmers[44] while fertiliser and pesticide use has increased. Loss of indigenous agricultural practices with adoption of credit-based cash cropping has extended to situations where a self-reliant agriculture would have been more suitable.[45] The northern region, once faunally diverse and

[43] G. Trebuil (1995)
[44] W. Choice (1995)
[45] J. Pretty (1995)

abundant is now said to be a near faunal desert.[46] Each of these examples is but a symptom of a deeper complacency about sustainable development that flows through agricultural expansionism.

Figure 2 Map of Agricultural Systems by Sustainability and Ideology

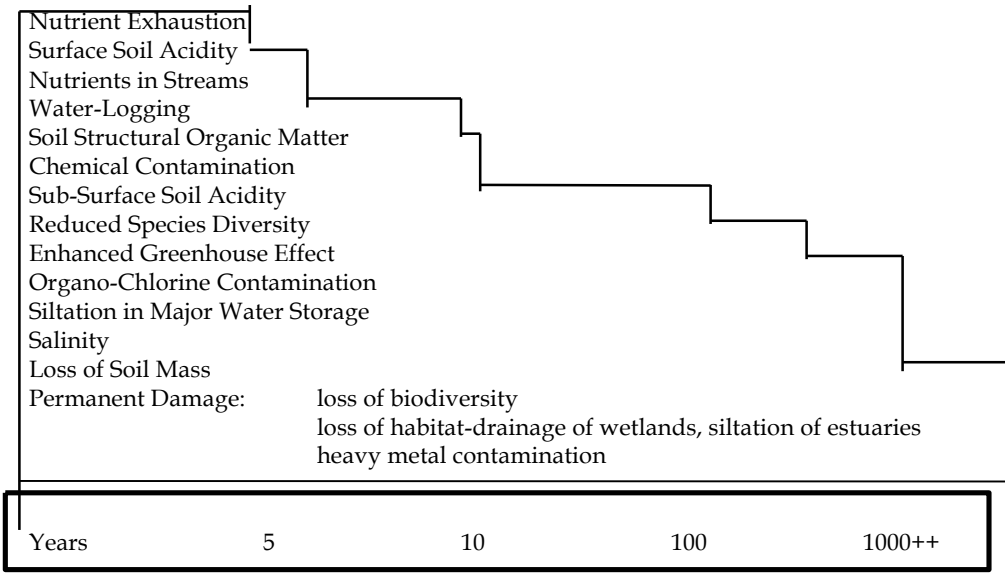


Expansion of Asian agriculture was accomplished mainly through the opening of new lands; now all that remains is less

[46] P. Dearden (1995)

suitable land, which is often comprised of marginal, steep, shallow and skeletal soils, with limited nutrients and moisture. Fertile, deep, relatively flat, well-drained soils of high natural organic matter have been degraded, and regeneration will be according to biological or geological time frames (Figure 3).

Figure 3 Restoration Periods for Various Forms of Soil Degradation[47]



Chemical herbicides utilised in Asian agriculture are of rising public concern; while their residues in food are now international trade and health issues, contamination of soil and water is the primary environmental impact. Extrapolating from other environments, seven of ten commonly used chemicals presently

[47] B. Roberts (1995)

critical to food production systems will soon be, if they have not yet been, found moving through Asia's soil and water.[48]

Water use and availability problems are increasingly felt to require resource pricing to stimulate sensible use and adoption of appropriate techniques. Tilling of wet paddies, as is traditional, facilitates transplanting of seedlings, assists land levelling, ploughing of weeds and stubble, and plant growth. Some irrigated cracking soils can lose up to 60 percent of water to permeable subsoils, yet simple post-harvest tilling can fill cracks and reduce both irrigation and chemical needs. As rice is expected to feed more than half of the projected world population of more than ten billion over the next thirty years through yield increases of more than 40 percent, Asian agriculture must apply such water saving techniques as: [49]

- wet seeding - pre-germination of seeds by soaking for 24 hours prior to being direct sown onto muddied fields
- intermittent irrigation - rather than constant flooding, irrigation is applied only when soil has nearly dried out, on a continuing basis until harvest
- land levelling - eliminating land depressions which require additional water
- weed management - flooding fields to suppress weeds before planting can be replaced by alternative cultural, mechanical or chemical means
- management of cracked soils - straw mulching and shallow surface tillage during the fallow period reduces subsoil and lateral water losses.

[48] V. Atlas and C. Giam (1988)
[49] IRRI (1999)

These are not necessarily sustainable development practices, just the best-known approaches at this time – they are possible means of approaching sustainable development.

However, it is water storage that continues to capture the interest of engineers and policy makers. Taking Southeast Asia as an example, we see that Lao-PDR relies on dams to earn foreign exchange from exported hydro-electricity. Elsewhere in the same area proposals for dams include: a joint construction on the upper Salween River involving Myanmar and Thailand; diversion of waters from the lower Salween into the Mae Taeng River; and the larger scale Pa Mon Dam project on the Mekong River with an eight dam cascade, or alternatively, diversion of Mekong River tributaries to hydro-electric generating facilities. While the emphasis on irrigation has slipped from primary to a secondary output, dam proposals still purport to assist agriculture. New dam proposals have yet to fully account for such factors as; the more than 20,000 square kilometres of forest lost to dams since 1960, illegal logging conflicts, past underestimation of silt loads and evaporation rates, overestimation of filling rates, urban and rural water conflicts, and reduced fish catches. To be fair, one must also note that resource costs are also omitted from most other development proposals. Perhaps dams are no worse than other developments that deal mainly in terms of financial costs and benefits.

Rubber, oil palm and timber plantations are increasingly claimed as a form of reforestation with positive environmental benefits, at least in Southeast Asia. Like other monocultures, plantations support low levels of bio-diversity, and are managed for product rather than as a natural resource. In Thailand, for example, some 35 percent of rubber was within designated native forest areas by

1986 and the proportion is now much higher[50] - likewise oil palms plantations have expanded with government provisions for private leasing of degraded forests. The extensive mangrove forests of coastal Asia have been degraded in recent decades by pollution, logging, and fishing, and have been decimated in some areas by conversion to prawn farms.

Prawn aquaculture exemplifies technology exceeding ecosystem management capabilities. In addition to mangrove destruction, chemical treatment to extend pond life inhibits organisms that consume residual feeds and wastes, allowing nutrients to accumulate until algal blooms occur and consume available oxygen. Ponds abandoned as new mangrove areas are cleared for new ponds now constitute a form of shifting aqua-cultivation.

Destruction of forests, rice cultivation, and ruminant husbandry are said to contribute to regional CO_2 and CO levels, although the main sources of such greenhouse gases (GHG) are the highly industrialised countries. Asia produces a small proportion of GHGs on a population basis and a relatively low proportion of anthropogenic GHG emissions on a country basis, and many of these can be reduced through known technological innovations for rice and ruminants.

Current reliance on a narrow gene pool in modern agriculture is a risk in itself as such reduced biodiversity creates vulnerability to climate changes, and reduced wild gene pools, which limits ready genetic modification of major food crops. Of the some 300,000 plant species in the world, between 10,000 and 50,000 may be edible, and 5,000 are used as human food; yet only three

[50] MIDAS (1991)

species, rice, wheat, and maize provide almost 60 percent of the global human diet. Within these species, breeding has eroded genetic diversity and hence adaptability to changing environments.[51] A casualty of modern agriculture, biodiversity cannot be recreated on demand as some suggest, because current knowledge of future genetic needs is limited and assumptions of omniscient and responsible social behaviour have always proved false. Sustainability of such development assumes continuous technological advancement, which in itself introduces new potential threats as it addresses current problems.

Emotive environmental discussions cloud balanced consideration of human needs and environmental tolerance, even when changed environments do not suit modern sensitivities. For example, objections to programs supporting plantations of *Eucalyptus* at the expense of small-holder forest access have invoked confused environmental arguments. Rational discussion is thus difficult and opportunities for informed and responsible scholars continue to exist. Just as rice culture dramatically changed the natural environment, so new tree species will lead to change. However, the major issue may now be one of social equity, which if subverted by quasi-environmental issues can reduce government focus on both social and environmental responsibilities.

The impact of global forces is evident in the debates surrounding many of the issues introduced above. Such influence may be traced through NGO and academic interests, both of which are linked to alternative views of sustainability through Western education. Interestingly, it is also the educational linkage, in the

[51] D. Tribe (1994)

guise of planners and others, which has fostered conformity with global economic development policies.

Global Development Forces

In seeking to emulate the wealth creation mechanisms of richer nations, the majority of Asian nations have had to accept the approaches of international development agencies, which have overtly assumed the need and desire for global economic development.[52] Sustainable development has been a relatively recent objective of these agencies after experience with narrowly based economic programs. This situation may have appeared to suit each nation's modernisation objectives, yet reliance on foreign funds encouraged private sector borrowing, investment and speculation. Mobility of capital renders reliance on this system risky; for example, contract growing can link small-holders to global price variations while exposing them to risks of trans-national companies relocating their investments. A tendency towards over-production that reduces prices introduces further price and market risks. The ongoing financial adjustments of Asia are testament to these risks.

Small-holders, the overwhelming majority of Asian farmers, have long been lobbied through extension promises; a current one is sustainability. New ideologies, justifications for clearly unsustainable practices such as shrimp aquaculture, and renewal of traditional values, have all invoked this new catch cry. The concept originated from good intent to balance Keynesian economics with social welfare, and continues to assume that the capitalist model is reproducible. As small-holders have become a

[52] Y. Biot, P. Blaikie, C. Jackson and R. Palmer-Jones (1995)

distant and uninformed component of a global trading system, any traditional environmental practices have been threatened by global attitudes of nature domination.[53]

A nature exploitation ethic seems to originate as a by-product of political development in post-agrarian societies[54] - this is not inevitable as is conveniently reasoned in some development analyses, but may simply be a naïve wish to duplicate recent Western political and economic history. Emergence from feudal societies allowed individuals to become intellectual and economic entities, which incidentally allowed a separation of socio-cultural matters from the natural environment. In place of superstitions, popular science and economics evolved into such ideologies as fundamental ecology.[55] Development agencies adopted the cultural base of their major funders and evolved a development approach from the Marshall Plan and subsequent experience, while maintaining a market orientation.

Emergence of regional markets, once thought to have arisen from simple aggregation of local systems, is now seen to have possibly been imposed by dominant entrepreneurs, and to have expanded to cover most of the globe.[56] Success of the free market approach separated economic from environmental interests. However, the separation of individuals from their natural environment stimulated neo-Marxist emphasis on responsibility in ecological management,[57] which evoked views that society may have evolved through householder resource-sharing prior to

[53] R. Murphy (1994)
[54] A. Kuper and J. Kuper (1995)
[55] A. Naess (1989)
[56] R. Friedlan and A. Robertson (1990)
[57] M. O'Connor (1994)

transformation by market mechanisms. These differing views led to central economic planning in systems upholding individual freedom supported by curbs on human excesses through education of the whole society. Each new phase in development theory has been visited upon the borrowing nations of Asia and elsewhere.

Failures to balance long and short term societal needs were manifested in environmental decline and its treatment as a technological problem, which supports a belief in continuous economic development, usually including intensification of agriculture. Application of development theory originating from the US Marshall Plan successes in post-World War II Europe used State economic planning,[58] which assumed adequate education levels, rule of law, and codification of moral values. As each was subsequently found to differ between countries, interest in the social values of specific cultures arose. The evident social and environmental costs then caused development specialists to reconsider the simple development model through emotive analysis, which produced social and individual choice models, and commitments to basic human values.[59] The early intuitive link between development projects and local requirements was thus shown to be appropriate in the resulting two-tiered development approach where the first tier concerned national structural adjustment including legislation, and the second aimed at specific local needs.

The Asian financial crisis highlighted the forgotten assumption of adequate governance, thereby completing the circle of social-

[58] C. Leys (1996)

[59] N. Long and J. Douwe van der Ploeg (1994)

economic factors long earlier defined by Adam Smith.[60] Sustainable development, arising from this historical context, might therefore be conceived as a recollection of past insights into human behaviour and experience in international development. However, an entrenched technological orientation focussed on understanding the limits of sustainability,[61] and exaggerated claims of 'sustainable technology', have undermined the credibility of technologists. The truth is that, in Asia as elsewhere, little is known of the relative sustainability of intensive agricultural practices. Sustained rice production across millennia is not an indicator of the sustainability of modern rice systems.

International development agencies can no longer plan projects in isolation from related developments globally, and national planners can no longer ignore legal, social equity, and environmental needs. Thus environmental values are added to economic models as social needs were before them. World Bank analysis of the past 50 years of international development produced four conclusions,[62] viz:

- macro-economic stability is an essential pre-requisite to achieving the economic growth essential to development;
- economic growth does not filter down to poorer elements in a society, which must be addressed through specific human needs projects and programs;
- a comprehensive group of integrated policies is essential to stimulate development, and
- sustained development requires socially inclusive and responsive institutions.

[60] A. Smith (1986) The Wealth of Nations (1976)
[61] M. Redclift (1987)
[62] World Bank (1999)

Accordingly, the World Bank has embraced sustainable development, including improvement of the quality of life through improved health and education, greater public involvement in government, inter-generational equity, and good governance in civil societies.

The preceding international development overview omits broader views of over-consumption and its links to the new engines of growth, which are knowledge and technology. It also omits the effects the development experience. Imported advice and policies can now be seen to have placed undue emphasis on financial costs and benefits to the detriment of social and environmental values, in what was an imbalanced and partial approach to development. Such imbalance introduced costs greater than benefits in many cases, especially for small-holder farmers. Nevertheless, future interpretations are likely to note the resilience of the development model through its ability to evolve as societal values are costed. Thus globalisation forces may be seen to operate in all directions between all countries and cultures – the feedback from the poor countries 'corrects' the model from experience. But to be enamoured with the model is to ignore 'the fallout of its continuing short-falls'.

The forces of global food demand and international development policy have combined to affect agricultural and environmental polices within Asian countries. In a more incipient manner, traditional practices and attitudes to the natural environment and its relationship to agriculture have also been affected by global forces.

Sustainable Development and Traditions

Asian agriculture remains dominated by poor small-holder producers. Development plans often assume that such social inequities and others arising from industrialisation would be addressed through greater national wealth disseminating benefits to the whole populace. Science likewise was portrayed as applied problem-solving technology to increase and sustain wealth generation, and as the scheduled discovery of transferable proprietary techniques. By contrast, environmental values are often ascribed to traditional practices and beliefs.

Importing of development planning to Asia, without the cultural associations that created the Western economic paradigm, has allowed contextless expectation of theoretical outcomes. Keynes' warnings against the subordination of matters of greater and more permanent significance[63] were not heeded in technically oriented development practice, and the deliberately narrow methodology of economics to interpret past interactions was trusted for forecasting. Human factors and natural resources were thus unwittingly valued at zero, and it was assumed that all income was of the same value regardless of its origin.

Of course, economic analysis allows such items as sustainably produced food, mined natural resources, or labour in primary, manufacturing, and services sectors to be variously valued on any agreed basis. The price for a resource may be considered to be the marginal cost of; supplying a resource to a user, plus any lost ecological functions, co-lateral pollution, lost future options, and lost existence and bequest value. However, this is still only a partial recognition of individual values ascribed to life-style,

[63] E.F. Schumacher (1973)

culture, and other costs of development which all form part of sustainability quests.

Scientific approaches imported to Asia may similarly have been misinterpreted into belief in a system that can deliver eternal consumer improvement. Its treatment in increasing isolation from the humanities has separated technology from parallel moral precepts once maintained through religion in the West, such that life is increasingly characterised in terms of scientific solutions to mental and physical health, and environmental problems. This precarious interpretation applies to all materialistic societies that assume continuous technological development and the honest market places. Sustainable development may be too much to expect from simple adoption of such a foreign model.

Competing with other low-income countries to join industrialised countries, which consume a disproportionate amount of global non-renewable primary resources, is extremely difficult to conceive as sustainable development. Fifty years of experience since the Marshall Plan in Europe shows that rapid resurgence in Germany and Japan was possible because essential foundations existed, including broadly based education, relatively equitable and working political and legal systems, and values which linked development to social stability. Elsewhere, the adoption of the accoutrements of industrialisation without such essential elements may simply render poorer Asian countries adjuncts of industrialised countries, relying on foreign management personnel and low local wage rates, to become a price taker to larger industrial groups.

Sustainable development, as currently interpreted in international development agencies, includes broadly based and effective education, social welfare policies, the rule of law, and adoption of a materialistic ethic in place of traditional values. To suggest that a country eschew social policies until industrialised wealth can redress social inequities is reminiscent of Keynes' prescient, and I hope cynical, advice that traditional virtues should be sacrificed to avarice and usury until economic growth has been achieved when a return to enduring values would be possible. Nevertheless, such policies have been advocated.

The demise of traditions has been eloquently introduced by specialists. By way of example, Thai experience illustrates such change where communal and traditional *muang fai* irrigation systems, which were sustainable across a millennia, have been replaced by government-managed irrigation systems. A perceived reduction in the influence of spirits on the control of natural events resulted among local communities, leading to a reduction in ceremonies, such as those to the Great Mountain Lord *Jao Khao Luang*, Lord of One Hundred Thousand Elephants *Jao Saen Chang*, Lord of the Golden House *Jao Ho Kham*, Lord of the Iron Wrist *Jao Kho Mu Lek*, and ceremonies on specific days of the waxing moon of selected months. Traditional irrigation managers who had organised these ceremonies accordingly lost their power as the *kamnan*, an institutionally approved locally elected leader, assumed authority. As noted in Chapter 2, villagers in such situations have perceived increased frequency of flooding, siltation of irrigation systems, and variations in rainfall regimes, and attributed these to a progressive usurping of the power of the spirits by the Royal Irrigation Department.[64]

[64] R. Lando (1983)

Interestingly, some traditional ceremonies have been absorbed into modern institutions, perhaps reflecting a success in sustaining some cultural associations, if not environmentally sustainable development.

As these spirits 'lost power' to officials, once acceptable practices, such as higher social status conferring higher levels of duty, led to reductions in maintenance of irrigation canals, protection of public forests, and even tidiness of communal areas. Moral and religious silence on environmental matters falsely assumed continued sensible behaviour; merit-making rituals performed for traditional reasons became unconnected to their past environmental associations.[65] So, the quest for sustainability in such circumstances becomes a question of the source of this supposedly new ethic.

Sustainability: A Local or Foreign Influence?

Environmental thought has been strongly influenced by Western ideas. Local environmental arguments against intensive agriculture have sought a value base in various religions,[66] thus leading many to assume an historical association of culture and religion with sustainable development. In fact, one can interpret this as both (or either) an emerging Asian environmentalism in the face of undesirable foreign economic influence, and (or) as the balancing forces of Western environmental and materialistic thought pervading an Asian culture.

Such traditions as Buddhism and Hinduism have proved amenable to ascription of such environmental approaches. Their

[65] J. Mulder (1968)
[66] I. Harris (1995)

love of nature is likened to respect and friendship with a fellow-being that seeks spiritual growth and is essentially part of the same entity, which in worldly terms, might otherwise be considered the external environment. Species eradication, economic development, individual acquisitiveness, technological control, and anthropocentricism ascribed to Western values are easily contrasted with such Asian views of; humans as part of nature, non-violence, mental awareness, conscious action, and ego extinction.[67]

Rather than past traditional values being revived, the link between religion and environmental consciousness may lie in modern thought. From a pragmatic 'scientific' world-view, modern eco-religious thought draws on a Western philosophical and intellectual base, possibly building on liberal Christian philosophy from the 1960s. Inter-religious dialogue over the past three decades found a common and unthreatening theme in environmental protection or care.[68] The interconnectedness of mankind is reflected in global environmental issues, discussion of which facilitated intellectual congruence in fora removed from cultural and historical sensitivities of each world religion. Categories of eco-religious thought include:

- eco-spirituality with an holistic view of the universe
- eco-justice for political, social and global equity
- eco-traditionalism or past values of resource stewardship.

Eco-justice views have been evident in Asia among social activists who link sustainability of society to religious principles. Post-1997 Asian economic crisis emotions have allowed these views to be widely canvassed as an antidote to excessive

[67] L.E. Sponsel and P. Natadecha-Sponsel (1995)
[68] P. Beyer (1994)

consumption, and to advocate attenuated industrial development as part of moderation and personal responsibility.

Social activists and eco-justice advocates are linked through some NGO development philosophies, which in fact lend credibility to these new religious views. However, extreme measures to motivate environmental action, such as warnings of an environmental apocalypse, might seem more easily accommodated in Western than Eastern thought. Ironically, in accepting the approach of eco-justice, Asian activists may have accepted a largely Western philosophy to counter the perceived unsuitability of Western economic approaches of recent decades. In any case, pragmatic embracing of such global environmental views appears to have been beneficial to date, and to have allowed consideration of some practical agricultural alternatives to large-scale, internationally financed development.

Practical Alternatives

As is clear to those experienced with small-holders, a working animal has a broader inherent value than a tractor; why then would mere work output determine the relative values of a tractor and a buffalo? If the animal and tractor are considered a metaphor for agricultural and industrial development, the paucity of understanding about agriculture engendered by its treatment solely as an economic activity may be clearer. Small-holders practicing a traditional self-sufficient agriculture may be shown to be more important than commercial agriculture when such a broader social paradigm is used.

Concern that modern intensive agriculture neglects beneficial components from traditional farming systems is likely to lead to

absorption of alternative agriculture into institutional definitions of sustainable agriculture. As the potential of technologies to increase food production and avert famine may have been reached in many areas,[69] the scope for traditional or alternative agricultural practices to complement Green Revolution technologies may be part of the next step of agricultural research and development in rural Asia. Agro-ecological approaches already attempt this by reducing costs for socially and environmentally informed technologies that do not necessarily assume lower yields. While these may not capture the entirety of integrated systems, sustainable development will include continuous redressing of demonstrably unsustainable practices as they are identified in ongoing monitoring and research – such a cycle of 'sustained research' is developed further in Chapter 9.

Alternatives to intensive commercial agriculture may be profitably considered in terms of their origin, application, and success in either more developed, or less developed, countries. Self-sufficiency implies quite different qualities of life in different countries in terms of health services, access to education, opportunities for one's children, and communication. Grouped as 'alternative agriculture', such approaches as self-sufficiency requires only low capital inputs and are ecologically considerate forms of food production that incorporate essential human values including self-reliance, healthy food, and some income.

Alternative agricultural approaches have been widely tested and indicate potential to meet many social and environmental objectives, though they may not meet the needs of short-term profit-making. A balance between social, cultural, and material

[69] P. Pingali, M. Hossein and R. Gerpacio (1995)

needs and maintaining cohesiveness of connections between human beings, the environment and the various aspects that make up life, are assisting realistic consideration of sustainable small-holder self-sufficiency. These examples are developed further in Chapter 8, and for the current purposes may best be considered in terms of policy outcomes.

Policy Implications

Recognising the existence of two agricultures in Asia, self-sufficient and commercial, as suggested in Chapter 3, is reinforced in the above conceptions. Agriculture should be valued as a social support system, as critical in post-crisis regeneration, as the major economic sector if labour inputs are costed at common rates in an economy, and as means of self-sufficiency. It therefore offers scope for reconsideration of science development policies.

Depending on one's political views, this can be seen as transcending materialistic developmental approaches, or recognition of two types of citizens, the urban and the rural, or alternatively, as consumers forming part of the global elite and the self-sufficient. However, the self-sufficient should not have to subsidise the lifestyle of the relatively wealthy, which includes the middle classes in Asia. If poverty is considered as the absence of an ability to work in a creative and productive manner to look after one's self and one's family, allowing a self-sufficient farmer to live in peace while enjoying basic social services may represent the closest practical approach to sustainable development that is possible on any large scale. It would also facilitate consideration of environmental care as part of a life-style approach to agriculture.

As 'increasing the cake' economics – that is economics that argues that a higher GNP offers scope for more wealth for everyone – is balanced with social equity, aspirations to wealth from widespread industrialisation can be viewed in terms of relative influence to control trans-national access to human and natural resources, and markets.[70] There is no reason to assume that sharing will automatically result from increased wealth being placed in the hands of the relatively wealthy!

While the 1997 crisis had specific impacts, these probably have little effect on long term price trends of agricultural products, shifts from trade barriers to quality assured specifications, and continued development of other sectors, with consequent reduction of the proportional importance of agriculture. Trends of the current decade remain important, including:

- increasing capital intensity in agricultural production
- increasing migration to cities of poorer farmers
- increased political polarisation between city and rural areas.

With these outcomes, despite other policy intentions, alternative approaches including self-sufficient agriculture and rural social programs are receiving some credence among the innovative financial plans that continue to recall the 1997 Asian crisis. The post-crisis interest in agriculture was clearly related to its export income through which it mitigated the full effect of the first year of adjustment while international loans were being garnered in the most affected countries.

[70] Sivaraksa, Sulak (1990)

The crisis largely undid past gains in reducing rural poverty. Stabilising and restructuring of economies has now shifted to restoration of economic growth through structural reforms, insulating poorer segments of the society from effects of the crisis and recovery, and encouraging reinvestment of international capital.

The crisis exposed inadequacies of the development model in Asia and thus all regions of the globe. Growth dependent on foreign capital, skills and technology was proven unsustainable. Industrialisation was revealed to have been largely cheap labour-based assembly lines that used simple technology and thus masked weaknesses in the essentials of education and research that underpin an industrialised economy. Investment attracted for reasons other than cheap labour, except possibly for expansion of agribusiness, included large-scale speculation, which tested the regulatory power of government and Asian cultures themself.

World Bank loans in response to the crisis are based on:

- restoring competitiveness through corporate restructuring, financial sector strengthening, and fiscal stimulus;
- strengthening public sector governance through capacity building in private expenditure management, administrative reform, and privatisation, and
- sharing growth through support for the unemployed and the vulnerable, empowerment of local communities, and financing of social programs.

Once again, such foreign forces appear to determine the direction of Asian economies.

Recovery from the crisis continues to influence current analysis and planning. Reliance on generic Asian remedies ignores the different economic structures between countries. Trade policy similarly has special needs where the majority of population is supported by agriculture and where agriculture embodies much of the cultural values of the society. For these reasons, small-holder agriculture including social issues determines success in sustainable development, rather than national income from agricultural exports. The latter required little input by government as the rise in demand for agricultural products provided windfall profits to Asia's agricultural exporters for a few years – but that has not been sufficient and the continued style of USA domestic subsidies has skewed international agricultural markets.

It seems that more detailed natural resource management plans[71] are evolving in each Asian country. In social terms, these may be linked to agro-ecological theory through practical self-sufficient agriculture, as a major component of balanced rural development that acknowledges the independence of small-holder lifestyles. Experience to date favours the embracing of development approaches that include such specific policy recommendations as:

- policies for commercial agriculture and poverty alleviation should not be mixed;
- environmental research should be encouraged and increased;
- self-sufficient agriculture should be acknowledged in social policies;

[71] Arbhabhirama, Anat, Phantumvanit, D., Elkington, D. and Ingkasuwan, P. (1987)

- prices and markets of agricultural raw materials should not be manipulated;
- loan programs should be oriented to commercial farmers and agribusiness;
- natural resource management plans should be prepared;
- farmers should participate in development planning, and
- government agencies should be reorganised to meet separate social, environmental and commercial priorities.

The essence of this approach to sustainable development is that near-subsistence small-holders require a different approach from commercial producers. While this can be supported by separation of agricultural from poverty alleviation policies, the latter must acknowledge self-sufficiency that sells surplus production. Agriculture embraces social more than financial and technical sectors in Asia while the majority of the people continue to be involved in it, even though they earn little. The global forces of financial institutions such as development banks remain evident as they must take a financial perspective, even on social programs. It is government with its many unsolicited advisers that remains the obvious responsible voice for sustainable development, both as an arm of global forces, and sometimes as a counterbalance to the excessive global forces. Experience to date suggests that the elusive sustainability has been conjured from existing research and development activities, and may in fact be as elusive as ever.

This chapter has considered the obvious global forces of politics, economics and institutional development agencies; however, an incipient mechanism of globalisation forces, which we may not need to label as good or bad in itself, is technology. Within the scope for enhanced agriculture production, breeding

technologies seem to offer the greatest future prospects in the form of genetic modification of productive species, and this technology is considered in relation to global food needs in the following Chapter 4.

Chapter 4

Technology and Food Needs: GMOs for GFN: Genetically Modified Organisms and Global Food Needs

invoking science to yield us more,
our nature we ignore

Global forces increasingly lead us to invoke technological solutions to social, environmental, health and most other problems. In agricultural terms, the last time that the world seemed destined to run out of food, the Green Revolution successfully applied technologies that averted disaster. These technologies may be grouped as irrigation, fertiliser and genetic manipulation, the first two of which seem to offer little further prospect for increasing food production unless the genetic potential of crops and animals is further improved. Accordingly, new breeding technologies are the focus of much research that purports to offer hope to the potentially food insecure regions of the world. So, those who advocate the development and use of genetically modified organisms (GMOs) claim, among other benefits, the potential for improving the nutrition of poorer countries. Outside the public fear campaigns and quasi-debates that surround the introduction of GMOs into Western diets and environments, there remains a need for honesty and distance from vested interests among scientists. The potential of GMOs includes; accelerating genetic change from the generational time-lines of traditional breeding, accelerating or retarding ripening and maturation processes, and controlling spoilage rates to suit harvesting, processing, distribution and retailing demands, as well as potential super-profits to

patent holders. It seems that regulatory frameworks, ownership of genetic material and GMO-related trade barriers may restrict the potential of the technology to facilitate equity in global food availability. As such ethical considerations are part of our scientific realm, our assumptions that we can distance ourselves from ethical matters, or that we can allocate the role to a committee, are no longer a sufficient service to society. If proper consideration requires true opponents, well armed, in the sense of the battle from which we derive the word 'debate', then information and knowledge sufficient to use it form the essential armoury. In this sense, the debate on GMOs, and the subsidiary issue of their use in the third world, must involve scientists on both sides – and they must have done their homework beyond the molecular laboratory and the once relevant but now dated Green Revolution arguments on means of achieving true food security in poor countries.

It is now commonplace for us, in more developed countries (MDCs), to assume that our higher lifestyles confirm the superiority of our system and our beneficence in extending it world-wide through trade, political intervention and economic policy. But the strong individualistic nature of our culture can conflict with the development of new technologies when we become aware of their drawbacks. This is why our fears for personal and environmental health dominate public debates on genetically modified organisms (GMOs). This has forced advocates of GMOs to widen the debate by claiming, among other benefits, that the technology affords better nutrition for poorer countries. Setting aside the self-interested domestic debate on the relative healthiness of GMO foods, this chapter seeks to widen consideration of the role of GMOs in the context of sustainable world food production.

GMOs in human foodstuffs arise from possibly the greatest current technological influence on agricultural production. The technology offers at least the potential;

- to accelerate genetic change,
- to accelerate or retard ripening, and
- to improve harvesting and processing efficiencies.

At the same time it offers potential profits to a small number of companies that control key patents and production systems.

The largely Western-oriented debate has been broadened to accommodate wide social and ethical considerations across generations,[74] by emphasising moral principles of caution and precaution in science.[75] On another side of the debate, moral issues concerning human rights to basic needs, including food, have been superficially invoked to accelerate use of the technology. However, regulatory frameworks, ownership of genetic material and GMO-related trade barriers appear to restrict the potential of the technology to facilitate equity in food availability. As introduced in chapters 2 and 3, such ethical considerations are part of the scientists' realm. Arguments that science is amoral may no longer suit our society, and may in fact reflect partiality.

This chapter examines sustainability from the perspective of a current issue in the application of agricultural technology by considering global food requirements, GMO technologies and their uses and Green Revolutionary arguments, and concludes that, for a sensible debate, increased scientist responsibility is imperative, but that neither sustainable agriculture nor food

[74] B. Adam (1999)
[75] B. Adam (1998)

security itself are fundamentally dependent on, or hampered by, GMO technology.

Global Food Needs

The catchcry of global food shortages used by international agricultural scientists since the 1960s is often heard as the boy crying wolf.[76] The facts are, that despite huge gains from the Green Revolution, such as a doubling in cereal production between 1960 and 1990 and a 50 percent fall in real food prices,[77] one in six persons in the world remains inadequately fed at any one time.

Global agricultural growth has slowed from around three to around two percent over the past decade. Poor nutritional quality continues to gravely affect life quality and span for many people.[78] While the potential to resolve current food deficiencies exists, this requires stable political conditions, and funds for the needy to purchase food. Putting the first condition aside for the purposes of this discussion, the second can be seen to be inappropriate for subsistence farmers facing crop failures in marginal lands, and for the urban poor. This is the focus of the *Future Harvest Centres,* as the institutions spawned by the Green Revolution are now termed. These Centres conduct research on behalf of the rural and urban poor through such programs as cattle vaccines in cattle-dependant communities in Africa,[79] and

[76] D. Mitchel and M. Ingco (1993)
[77] A. McCalla (1998)
[78] FAO (1999)
[79] W. Morrison (1999)

low water use systems of rice cultivation in increasingly water-scarce Asia.[80]

Population projections for the coming decades compel us to reconsider both funding and approaches to agricultural research. Conservative estimates indicate that over the next two to three decades, population will rise by a further two billion, 95 percent of which will be in poorer countries. Food demand for a 42 percent increase in population to the year 2025 has been estimated to require a further increase in marketable grains of 60 percent.[81] This higher proportional increase in food demand results from rising consumption rates in countries with improving standards of living, and the drift of populations to cities where land is at a premium. Such an increase in food production has once before been met – through the application of science, albeit in an era of low environmental consciousness. It was also assumed, until recently, that the poverty would remain an overwhelmingly rural issue.

By 2015, the population of cities in poorer countries is expected to exceed that of rural areas.[82] Poverty will be both an urban and rural issue, rising possibly by 100 percent from today's 1.3 billion who are classified as absolutely poor,[83] or 3.3 billion persons whose diet is probably compromised by poverty. In a world where agricultural trade represents only about ten percent of global production,[84] it would seem that the additional food will need to be produced where it is consumed. The labour demands

[80] IRRI (1995)
[81] A. McCalla and L. Brown (1999)
[82] United Nations (1996)
[83] World Bank (1997)
[84] A. McCalla and L. Brown (1999)

for such production can incidentally assist the poor and thus provide the stimulus for further economic development – the time-proven model of agriculture as the engine of economic development. Such an encompassing perspective is easily lost in major agricultural exporting countries where farming is divorced from urban pursuits.

Agriculture practiced in small urban plots already involves some 800 million persons,[85] mainly in poorer countries, and will become more significant. Other agricultural land is overused in many cases. But producing the required food relies on increasing yields in all areas, and this is what GMO technology has long promised.

GMO Technologies

GMO technology varies from traditional breeding techniques through its increased precision to produce desired genetic outcomes and through its compression of the time required from identification of a need to development of a product. Most scientists see it as the current stage of breeding technology development that is traced from Mendel's inheritance work with peas of 1865, which remained un-appreciated until about 1900. The next stages of radiation-induced mutants in the 1920s, then chromosome and gene manipulation, produced reliable hybrid vigour in maize and other plants in the 1930s. Tissue culture and embryo rescue techniques, and the critical discovery of DNA structure and molecular genetics then paved the way for determination of gene locations and functions. Transfer of such genes between species concerns the current debate. By 1998, the

[85] L. Mougeot (1996)

world market for GMO-related products was estimated at US$13 billion and rising exponentially, with some 80 new products approaching readiness for market, mainly for health care.[86]

Drought resistance, salt and toxic metal tolerance, improved human nutritional quality, delayed ripening and spoilage, and pest resistance have been conferred on crop species through GMO technologies. In 2001, food-related GMOs were grown by some 5.5 million farmers over some 53 million hectares, an area increase of 91 percent over 1998. More than twelve countries grew GMO crops in 2001 when the main plantings (percent) were in the USA (68), Argentina (22), Canada (6), China (3), and Australia and South Africa (each less than one percent). The major crops were soybean, maize, cotton, and canola/rape seed, with some potato, squash and papaya. The major GM attributes were herbicide and pesticide resistance. Except for the USA, the trend in expansion of GMO crops has shifted to poorer countries.[87] Traits valuable in poorer countries include:[88]

- Beta carotene enrichment (to address vitamin A deficiency)
- Improved nutritional value of oils, starches and proteins
- Improved fatty acid profiles
- Enhanced animal digestibility efficiencies
- Delayed over-ripening of fruits and vegetables
- Bacterial and fungal disease control
- Virus and insect resistance
- Salt, aluminium and manganese tolerance

[86] G. Persley (1999)
[87] Updated from C. James (1998)
[88] F. Salamini (1999)

The principle is easily demonstrated by example; a gene that increases Vitamin A has been taken from a daffodil, and one that enhances the bioavailability of iron has been taken from a French bean – both have then been inserted into rice to address the Vitamin A and iron deficiencies in the diets of poor countries. Such results can be expected to foster support for GMOs to address other food needs, and to increase production by the 60 percent that is said to be needed over the coming decades – at the same time, it seems we are requiring that such food be produced with less environmental degradation. Thus an environmentally aware new Green Revolution is hailed – perhaps it will prove true, but no-one really knows.

Revisiting the Green Revolution

The 1960s and 1970s showed high returns to international agricultural research oriented to poor countries. Today, it has become fashionable to criticise the environmental impact of those Green Revolution technologies while failing to acknowledge the averted starvation and the environmental values of that time. Environmental costs were and are real, yet even today they pale against the higher moral responsibility to feed fellow humans. Environmental considerations pervade agricultural research and development today, including GMO technologies. However, it is mainly we agricultural scientists ourselves who argue for GMOs to feed the future populations, and as critics note, - *they would say that, wouldn't they!* Our credibility is low – and perhaps rightly so.

In the absence of politically viable alternatives, widespread use of GMO technologies in poor countries seems attractive. Trade barriers to importing GMOs are already being erected, ostensibly

in response to public opinion in richer countries, although non-GMO producers in those countries appear quick to support the benefits of reduced competition. Such restrictions of trade close options for improved national income generation in poor countries, thus ironically increasing dependence on yield-enhancing GMO technologies.

So in such circumstances, does the Green Revolution provide an instructional model for the expansion of GMOs in poorer countries? The answer is *'yes and no'*. Reduced unit-costs of production and food prices from the Green Revolution provided major benefits to poor consumers. GMO technology offers similar potential. Thus new issues arise including; intellectual and genetic property rights, private versus public research, relative sharing of benefits between producers and genetic patent holders, and the short-term focus of modern research. However, today's GMO research is oriented to rich country agriculture while that of the Green Revolution was oriented to poorer countries. Transfer of technologies from rich to poor countries requires adaptive research, and this is in fact the phase that is more correctly associated with the Green Revolution; this is not the current phase of GMO technology, which is much more one of develop-test-commercialise as fast as possible.

Perhaps more obvious difference is that between the public support of the Green Revolution and the concentration of GMO technologies in private companies. Patents owned by private groups preclude reuse of seed produced by farmers without prior agreement, and technologies to render second-generation seed less productive or non-viable will probably be introduced. However, this differs little from the hybrid seeds of the Green Revolution. One commercial group has even agreed to assist

poor countries by withholding use of such technology, the *terminator gene,* from seed released in those countries. Nevertheless, concern has been elevated with the concentration of ownership in a few multinational firms as a result of successive mergers in the 1990s. If patents are simply seen as 20-year monopoly rights to a breed of plant, our Western concepts of fair-gain for fair investment will ultimately find little wrong with the approach – but other cultural conceptions exist in poor countries, including that of the universal right of access to food producing seed. The lessons of what constitute a basic right as discussed in Chapter 2 may well come to haunt us, and soon.

Just as the Green Revolution introduced unforeseen risks, in that case to the environment, so GMOs contain unforeseen risks, as well as some that have already been foreseen. Yet, the combination of multinational ownership of research and development resources, and a clear avocation of the use of GMOs in poorer country agriculture, is likely to accelerate its application. Our record is consistent in such matter – *once developed, a technology is always used!* Hence the question may not be whether GMO technologies should be used, but what are the major issues and means of managing associated risks? Then we can consider whether sustainability is a consideration among GMO issues or not.

Issues and Risks

GMOs in agriculture raise ethical issues of food and environmental safety, commercial intensification, intellectual property management.

Food related risks of GMOs are considered to be minimal apart from allergic responses, which have in turn been an influential component of arguments to enforce labelling of GMO inclusive products. Proponents point out that consumers in North America, China and to a lesser extent Australia and Europe, have eaten GM foods for several years without apparent effect. Environmental risks include reduced genetic diversity, potential escape of genes to wild populations, inadvertent facilitation of the emergence of new pathogens, and resistance to GMOs' insecticidal properties.[89] All are real risks; for example, the escape of genes from GM crops to native species is now considered inevitable.[90] However, their escape would reduce the fitness of recipient plants, which would lead to rapid selection against retention of the genes in the native population. In terms of weediness and other traits, existing regulatory mechanisms are said to be appropriate,[91] although public confidence in government regulation of GMOs is remarkably low.[92]

Large capital requirements and ownership of genetic material may also further intensify the global food industry,[93] which could reduce interest in the food needs in poor countries. Profits will be limited to the rich countries, unless some means of making poor countries attractive to multinationals is developed. The bias toward richer countries is already evident; expansion of areas of GMO crops from 1998 to 1999 was some 9.4 percent for industrialised countries compared to 2.7 percent for poorer countries.[94]

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[89] J. Rissler and M. Mellon (1996)
[90] A. Chevre, F. Eber, A. Baranger and M. Renard (1997)
[91] J. Doyle and G. Persley (1996)
[92] ESRC (1999)
[93] T. Marsden and I. Drummond (1999)
[94] C. James (1998)

Ultimately, the agricultural argument may well follow that of the (in the past, non-GMO based) pharmaceutical sector, which is dominated by multinationals that regularly release new products after evaluations indicate that, overall, benefits exceed risks. However, the impact of private sector influence over GM technology highlights underlying ethical issues.

Three aspects of ethics concern this discussion. The first is that of irreverently intervening in the natural order of life; an issue worthy of wider consideration according to the arguments of Chapter 2, yet the outcome will probably be predetermined by its powerful proponents, as ever. Perceived risks of GMOs in rich country communities, and an air of inevitability about expansion of the technology, introduces a second group of ethical issues – the exporting of risks to poor countries on the one hand, and *genetic mining,* a practice of patenting communally developed crops used for centuries in poor countries, on the other. Ethical science and technology require the establishment and adherence to socially and scientifically acceptable principles and protocols for such issues, and societal ethics requires the same level of adherence across all countries. It is unethical to export risks. Mining of genetic resources of poorer countries is ongoing and difficult to control.

The third ethical issue concerns means of addressing the future food needs of poor countries. Free trade is touted as ethical because it supposedly opens barriers to economic goods in the manner of the free movement of capital; but while the other component of economics – labour – remains restricted, it is difficult to accept such free trade arguments as ethical. GMO technologies that can increase food availability and decrease food

production costs in poor countries may thus be the extent of possibly ethical actions at this time. Pragmatists even argue that, for these reasons, it is ethically unacceptable to restrict GMO technologies.[95]

With a need for more food, an absence of new agricultural land, and rising environmental concern, use of yield-enhancing GMO technologies seems inevitable. The GMO debate must acknowledge these conflicting factors.

Making a Decision

So we cannot turn our backs on GMO technology, but we do need to be very careful. Bio-technicians have consistently underestimated the risks and lead times involved in this field in the face of demands to schedule research outputs. Making a decision about the development and use of GMOs requires the input of all informed scientists and will necessarily involve uncertainty and global humanitarian issues.

Uncertainty is common to most decisions surrounding science. It has led to the precautionary principle of testing and monitoring. In the case of GMOs, the issue is not soluble through such tools of science alone, and indeed the track record of science-only decisions is variable in matters with social dimensions. In addition, scientific assessments of risks are usually based on simple comparisons rather than simultaneous consideration of interactions between multiple factors, and even then commonly produce inconclusive results. For these reasons, coupled with the likely long-term nature of such work and its low contribution to

[95] NCB (1999)

career rewards, scientists are not usually attracted to analysis of social and environmental risk assessment work.[96]

Humanitarian arguments imply that we have little choice but to use GMOs in poor country agriculture in the absence of global economic equity and population reductions. And once again, we do well to recall Keynes'[97] cynical comment that traditional virtues would have to be sacrificed to avarice and usury if economic growth is to be achieved, at which time a return to enduring values may be possible. Reinstating enduring values seems to have been more difficult to accomplish than licensing avariciousness! This is field in which traditional Eastern and modern Western values can easily be mis-communicated. So, at best the GMO decision may be one made between the lesser of evils.

Under such circumstances, practical decision-making will include:

- Creating international roles for public sector activities in research, development, and regulation
- Encouraging private companies to acknowledge global food needs, and to collaborate with public sector institutions
- Broadening public education of global responsibilities and risks
- Acknowledging the likely inevitability of widespread GMO use, and owning up to its role as a partial substitute for equitable international policies.

[96] C. Williams (1998)
[97] E.F. Schumacher (1973)

Rather than simply allow the GMO debate to concern producers and consumers in rich countries, or even the future food needs of poor countries, wider understanding of inequities in existing global structures would inform both public and scientific debates. Nevertheless, the potential to increase yields while minimising the area needed for food production will probably overwhelm other concerns. We should hasten slowly this time. Similar situations in the past have not precluded scientists and technologists from philosophical investigations beyond their field. Neither should they in this case.

This debate continues to move on. We find ourselves caught in a Pandora's or Prometheus' myth, charged with management of evils we release. Europe's response to prohibit production and sale of GMOs, while seemingly responsible, is mainly driven by health and self-protection motives, in the same manner that consumer opponents in the West seem to be saying 'if we can produce enough food [for us] without the technology why take the risk?' And there are unforeseen risks – risks that we have not followed our scientific method correctly. Heretical as that may sound, it does seem that errors compound in molecular genetics when its technology is divorced from an understanding of the expression of alleles in different environments.[98] To expect a change in an allele demonstrated under favourable testing conditions to deliver the same positive characteristics and no additional negative characteristics in diverse farmers' fields is to ignore the underpinning influence of gene:environment interaction that is a critical component of all genetic prediction. And when we forget such a basic aspect of our field, claiming sustainability of such technologies is nonsensical.

[98] R. Beilharz (2003)

Is it possible to round off with a clear opinion on GMOs? Of course, various opinions can be tendered; mine is that we do not need the technology if we act equitably. In a rational world we would pause before even considering researching the subject. This attitude is evident in our reticence to allow widespread genetic modification of animals, but in fact the approach we have taken of encouraging widespread research on plants, is in effect the prelude to animal work. Recognising that the horse has bolted renders pointless debates about closing the gate. One might argue to close the gate on further work, but the gatekeeper is no longer in control with much of the leading work being conducted beyond the reach of would-be regulators. GMOs fall squarely within the paradigm of 'if we can do it, we will, and when it is made practical, we will use the technology in everyday life'. This is why I consider that the only approach is to accept this as a natural phenomenon that sets up conditions that will have consequences, which we will live with – I do not foresee that we or much else will die from the technology. We can slow the process, as is occurring in Europe, but its inevitable global expansion involves all of us. Nevertheless, one thing is sure – if the objective is commercial profit, it is unlikely to make a real contribution to the quest for sustainability, and even if it is contrarily argued, the view of sustainability in such a case is likely to be one based on self-interest within a limited definition of humanness.

Whether or not GMOs are essential for the human daily bread harks back to the age-old conceptions of the basic needs of food, clothing, shelter and basic medicines. From these basic needs, we have added more and more 'wants', and craved them to such an extent that we have deluded ourselves that they are in fact needs,

and in that mind-set we have refused to share our excess with others. Whether we prefer more than just the basic needs or not seems to depend on our personal insights about life among other factors, but such differences do not logically or morally suggest that we are entitled to more food, clothing, shelter or basic medicines than any other human. It seems to me that we should all know this, but are able to ignore the implications by talking of 'the reality' of such concepts as national borders and differing opportunities.

Perhaps when we see a little more broadly, it may be clear that such so called 'realities' are not immutable and are, in fact, consequences of earlier and continued actions. But this should not necessarily induce some anarchical behaviour, just some small insight into the means by which we create our own 'reality'. By the same rationale, sustaining ourselves may require some preservation and storing of food and possibly other basic products, but it does not require sustaining of a company's profits or hoarding in the hope of selling at a future high price. Such short-term self-interest places the forces behind GMO development far from the roots of sustainability, making true sustainability not just elusive but illusory – though we must test this conclusion further. Ensuring the food security of all persons in the world is a widely agreed objective, regardless of the use of GMOs, and to do this in a sustainable manner would seem to be an ennobling aspect of agricultural science and development. This aspect of sustainability forms the subject of the following chapter.

Chapter 5

Re-conceiving Food Security and Environmental Protection

our superficial civil heart,
belies the beast below

Expectations of continued population growth to 11 billion, mainly in less-developed countries (LDC), define much of food security and environmental protection for the remainder of the century. Conventional models predict an increased demand for cereal of 40 percent met by increased production mainly in LDCs, as more-developed country (MDC) exports decline in response to falling prices. While production seems adequate for the higher projected population, continued distributional and nutritional inequities are foreseen. Therefore, while food production is likely to maintain priority over environmental protection in LDCs, environmental remediation is expected to benefit from technology, particularly in MDCs. Rising understanding of the mutual causality of impoverishment of people and the environment may well focus more on non-technological factors through this century than the last. However, outside agricultural circles, philosophical thought has advanced beyond the anthropocentric approaches of sustainable agriculture to consider the rights of nature. Increased societal awareness of such matters may influence the overall development paradigm within which rests most of our agricultural research. A reduction in total food requirements is implied from family self-sufficiency systems if they are accepted as not only socially beneficial, but also as a means or recognising food security as the universal right of access to nutritious food. Such security may also

enhance protection of environments in LDCs, though constraints on free movement of labour will probably reduce overall benefits. Whether such changes occur, there is value in widening the ethical perspective of all associated with the manipulation of nature and planning of human development.

Food security is an essential precursor to environmental protection. From global and population perspectives the issue may be cast in terms of poverty forcing otherwise environmentally responsible farmers in less-developed countries (LDCs) to sacrifice long-terms goals, as well as a denial of basic rights to food, shelter, clothes, and essential medicines. Over the past forty years, development that supported global food security has moved with political imperatives and experience, beginning with emphases on food energy and protein supply, and then progressing to concerns of equity of access and consideration of malnutrition - all within an industrial market model. Concern about natural resources scarcity has broadened to include degradation in parallel with changes in food security approaches, and linked increasing population to emergent strategies for sustainable natural resource management - which now appears to herald 'sustainable food security'. The implications that food security has somehow been achieved may continue to distract us from the continuing failures of the market model in marginal and densely populated areas of LDCs.

No discussion of agriculture can be considered to address sustainability issues unless it includes the global food security. Sustainable food security is perhaps the most difficult of the agricultural issues, and may yet render the whole approach to sustainability to be perennially elusive. This chapter begins with

an examination of the meaning of food security, and then introduces the conventional arguments concerning food availability, which are based on food production, human population, distribution, conflict, and environmental compromise, mainly in LDCs. The outcome of such environmental and food demand debates usually arrive at the need for sustainable production approaches, which themselves draw from a separately emerging philosophical base in the West. The discussion considers an alternative conception of the factors that contribute to food insecurity, and concludes that if these remain unaddressed, we may expect them to continue to undermine technological attempts to ensure food security, and environmental protection.

Feeling Secure

Food security may be characterized as *informed confidence of all persons in a self-identified group within a society of their ability to access adequate nutritious food for their families at all times.* This definition is amplified in the following paragraphs.

Confidence is critical; assumptions that national average food production figures can indicate food security are belied by internal distribution constraints, political limitations on access, inabilities to purchase available food, over-consumption in segments of a population, policies which encourage farmers to shift from family food production into cash crops, crop failure, storage losses, and a range of other factors. An educational aspect to the definition is contained in the word '**informed**'; food secure persons know the quality and amount of food needed by their family from tradition and general education. Unless all persons feel secure and are confident in their knowledge of the

quality, quantity, and reliability of their food supply, global food security averages cannot be extrapolated to specific cases.

The unit of food security is commonly assumed to be a country in global comparisons. In fact, feelings of security are more likely to be derived from reactions of a **self-identifying group** within a society. Global statistics cannot readily be sorted by such small and unofficial units, and encouragement of such segregation may be discouraged by some governments.[99] This allows access to food to be used as a political mechanism in extreme circumstances, which can exaggerate food insecurity, and thereby make food insecure communities ready targets for recruitment by modern warlords.[100]

The ability to **access** adequate food covers industrial and cash-cropping farmers, subsistence farmers during crop failures, and non-agriculturists. Access can be limited by local storage failures, low purchasing power, and corrupt or inefficient distribution mechanisms, among other factors. Quality of food, in terms of its **nutritional** value, is determined by freshness or processing and handling techniques, variety, and chemical composition. A new component to food security is the rising occurrence of malnutrition in agricultural areas where cash crops replace local food crops.

The basic unit for food security within a poor community is a **family**. Parental sacrifices for children's welfare is daily demonstrated under conditions of scarcity. Families contain the effects of policies, which perhaps as externalities of otherwise well-intentioned policy actions, create unemployment,

[99] M. Renner. (1996)
[100] I. de Soysa. (2000)

inconsistent agricultural prices, and a continuing need for credit-based farming and lifestyles - thus families are the logical focus for definitions of food security. Family food supply must be secure '**at all times**', not simply on average, thereby implying that local storage facilities must be effective, that staple foods are available out of season, and that distribution systems are uninterrupted by weather, political or budgetary cycles.

By way of comparison, the World Bank defines food security as 'access by all people at all times to enough food for an active, healthy life', omitting the elements of confidence, education, family and community within the implied market context. To understand food security requires more detail than national statistics. However, for a global analytical perspective, this seems impossible at the present time; therefore the common expression of food security calculations must serve for the macro-level picture. Perhaps the best of the conventional market-oriented analyses is that of the International Food Policy Research Institute known as the IFPRI model and sometime referred to as IMPACT.[101] The model is updated periodically – the 2002 version was on the web at the time of writing, presenting the same general picture as that discussed below from 1999 statistics.

The IFPRI 'World Food Situation'

Food security is said to be a concern to all international development agencies, but as their perspectives are surprisingly similar, the IFPRI model is here discussed in more detail after an introduction of other agencies' approaches. The Food and Agriculture Organization of the United Nations divides its

[101] P. Pinstrup-Andersen, R. Pandya-Lorch, and M. Rosegrant. (1999)

analysis into sections of; people, institutions, knowledge, and environment, and assumes that all people should be brought 'into the economic mainstream', that 'reconstruction of rural institutions [and laws] is vital to economic recovery', that new although different technologies are needed for both high-potential and marginal areas, and that 'ecologically sound technologies' can produce higher yields.[102] The World Food Programme appears to acknowledge self-sufficient agriculture as a component of food security within its 'short term solutions' although it retains an overall orientation to economic growth as the source of increased food security.[103]

USAID claims that more than 20 million US citizens are food insecure at any one time, although its policy does not appear to relate this to social factors, and bases its international argument on traditional macroeconomic approaches without reference to human or nature rights. It concludes that the private sector is critical to food security in a free market that will stimulate widespread economic growth and thus provide income 'to help assure that the global community has access to the agricultural abundance of the United States'.[104] The biotechnology company Novartis' statement on food security argues for public investment in LDC biotechnical research on the grounds that commerce will orient its research to wealthier markets, and that LDC dependence on MDC grain is unsustainable. Expanding cropping to new areas with an overall intensification in a second Green Revolution is implied within a competitive world market model, which suggests that technology should be oriented to

[102] FAO (2001)
[103] C. Bertini. (1997)
[104] USDA. (1997)

commercial potential.[105] The International Council of Science Unions analyses the issue broadly, including the need for local food production, and concludes that science might be directed to the problem areas in LDCs, although funding of such programs is an acknowledged difficulty.[106]

The common approach of these agencies can be appreciated through the IFPRI model, a food demand and supply model that includes food production, population, and the range of factors which impinge on the 'average food security' calculations on which nations can base macroeconomic policy. In assuming that 'good governance' is an outcome of development, the model need not move beyond its national database. This introduces as limitation when governance is not as assumed. It also assumes active free markets and free trade, and that agriculture can be viewed as similar to any other industry. Such assumptions are probably too ambitious, as discussed later in the chapter.

The major variables in global models such as IFPRI's are the populous nations. China and India can skew global interpretations, as can political change in a major agricultural producer such as the former Soviet Union. However, if national borders are ignored, the major variable remains population, as it has been since Malthus and his predecessors and successors.[107] Globally, 'about 73 million people, equivalent to the current population of the Philippines, [is being] added to the world's population on average every year between 1995 and 2020, increasing it by 32 percent to reach 7.5 billion in 2020'.[108]

[105] Novartis. (2001)
[106] D.O. Hall. (2001)
[107] Hung Ling-Chi (1793) refer to Ho, P.T. (1959)
[108] P. Pinstrup-Andersen, R. Pandya-Lorch, and M. Rosegrant. (1999) Page 8.

Most of the growth in population is predicted to be in LDCs and increasingly in cities, such that the model predicts that by 2015 more LDC citizens will live in urban than rural areas. City residents have less opportunity to practice subsistence agriculture. As a consequence of these trends, 'almost all the increase in food demand will take place in developing countries'.[109] China is predicted to represent 25 percent of the increase in global grain demand over the next 20 years, and as India is expected to exceed China's population while continuing its economic expansion, increased affluence and therefore higher consumption levels may increase demand figures further than currently estimated.

The result of the predicted increases in population and food demand is that by 2020, people in LDCs will probably still only eat less than half the amount of cereals that we overfed MDC consumers will. The rising affluence of Asia, notwithstanding recent setbacks, is predicted to stimulate demand for livestock products, and as a consequence double the demand for cereals used as livestock feed. Other shifts in demand include an expected global rise in popularity for maize over wheat and rice.

Grain demand in 2020 is predicted to be 40 percent above 1995 levels (85 percent of which will be in LDCs), while the land area available for its production will probably be less (land availability in Sub-Saharan Africa is difficult to factor into the model), thus leading to one of the conclusions that further yield enhancement research is warranted. We have come to assume that yields continually rise as an output of technological research,

[109] P. Pinstrup-Andersen, R. Pandya-Lorch, and M. Rosegrant. (1999) Page 9.

although recent experience suggests a slowing of the rate of yield increase. Analyses of prices indicate that grain, the major human foodstuff, will probably remain at its current low levels or perhaps fall further, thereby decreasing grain planting in MDCs. A 2030 population of 11 billion, mainly in LDCs, leads to the model indicating that average individual calorific intake in LDCs will rise to 2,800 per day from grain and meat consumption levels that are 50 and 65 percent below those in MDCs respectively.

IFPRI therefore concludes that food production in LDCs will need to expand more than in MDCs, and that inherent limitations will still necessitate a doubling of LDC cereal imports, about 60 percent of which will come from the USA, and an eight-fold increase in meat imports.

From the perspective of LDCs, the IFPRI model predicts that 'with increased production and imports, per capita food availability in [LDCs] will increase'.[110] However, even under this 'average food security' approach, food insecurity is predicted to continue in the form of malnutrition in some 135 million children under the age of five, and in South Asia for example, the incidence of child malnutrition is expected to be around 40 percent. The model is inevitably subject to unpredictable factors, some of which have been enunciated by IFPRI and are summarized in the following sections.

Conventional Considerations

[110] P. Pinstrup-Andersen, R. Pandya-Lorch, and M. Rosegrant. (1999) Page 17.

Models are necessarily based on a number of assumptions derived from observations of the past. In the IFPRI Food Policy Report,[111] six 'emerging issues' that may impact on the model's predictions are discussed. As summarized below, these are: 'new evidence on nutrition and policy', 'low food prices', 'trade negotiations', biotechnological advances, information technology, and 'the potential of agro-ecological approaches'.[112]

New evidence on nutrition and policy indicates that some 33 percent of LDC preschool children are probably stunted at present, a continuing reduction from 47 percent from 1980, albeit with rising incidence in pockets of absolute food deficiency. It also indicates that low birth weights contribute significantly to future malnutrition and premature death, that iodine deficiency affects some two billion persons, that iron deficiency anemia affects a similar number of mainly women, and that Vitamin A deficiency is 'widespread'. Programs to address child malnutrition are constrained by parental income levels and national governance approaches according to the conventional analysis, which is based on observations that improved nutrition is associated with increased secondary school enrolments of women, and absence of civil disorder. Food insecurity is thus widened by such new information, and is related to non-agronomic factors – as is so much concerning sustainability in agriculture. In addition, FAO considers the trend of reducing malnutrition to have been interrupted in 1998 by economic and environmental factors,[113] thereby highlighting the reliance of the overall approach on the continued well-being of the relatively wealthy.

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[111] P. Pinstrup-Andersen, R. Pandya-Lorch, and M. Rosegrant. (1999)
[112] P. Pinstrup-Andersen, R. Pandya-Lorch, and M. Rosegrant. (1999) Pages 19-29.
[113] FAO. (2000)

Low food (grain) prices have been observed for decades and in 1999, reached the lowest in one hundred years. Volatility of prices has been attributed to weather patterns, reduced rates of increase in yields, subsidy programs, and variations in planted areas. Global planted areas of grain are estimated to have reduced by about three percent between 1995 and 2000, which is less than was predicted from the rate of decline in demand at the prevailing prices, including reduced imports of livestock feed grain by Asian countries affected by their financial crisis. IFPRI notes optimistically that rising demand for grain should cause a price adjustment because prices for wheat and maize in 2000 are below the long-term trend line, and demand for livestock products in Asia should rise significantly,.

Trade negotiations for liberalizing of markets may not benefit LDCs that are unable to obtain improved access to higher priced markets because they are constrained by poor administrative and legal capacity to manage such issues as food standards and plant varietal rights. IFPRI concludes that it is important to 'continue to pursue domestic policy reforms that remove distortions adverse to small farmers and the poor, while facilitating access to the benefits from more open trade'.[114] While oriented to trade, the approach could perhaps be, and I hope is, interpreted to include an incidental subsistence orientation to local food security, in parallel with separate policies for commercial agriculture oriented to domestic needs before international trade income.

[114] P. Pinstrup-Andersen, R. Pandya-Lorch, and M. Rosegrant. (1999) Page 24.

Biotechnological innovations offer the prospect of further large yield improvements. Opposition to genetically modified foods in the West is considered in conventional arguments to be deleterious to the interests of LDCs where the technology offers, among other things, higher yields, improved nutritive value of existing crops, and expansion of the environments in which preferred crops may be grown. To use the technologies, it is suggested by advocates (see Chapter 2) that aid be oriented to supporting LDC promulgation of intellectual property rights legislation so that the owners of the technologies will release them for use in LDCs. The argument is readily supported by researchers who seek environments in which they may continue to develop new crops and technologies, and may at times lose some objectivity; for example, the issue in the West may appear to be mainly uninformed opposition to perceived risks in GMOs used as food, but may also reflect a rising concern with technological and ecological issues, and the concentrated private ownership of genetic material.[115] The technology's greater value to commercial than subsistence agriculture appears to make it an unreliable basis for food security in the short term when compared with other values discussed later.

Information technology, which allows processing of information for a fraction of past costs, offers prospects for widening rural access to education and other social services. It also applies to extension, market information, and farm level technologies in such forms as geo-positioning for fertilizer application in commercial agriculture. In the educational mode, information technology appears more likely to be used to promote commercial in place of subsistence farming as a means of

[115] L. Falvey (2000c)

increasing food security through expected increases in purchasing power.

Agro-ecological approaches constitute an attempt by intensive agriculture to learn from traditional practices. This is usually viewed as evidence of the working of the iterative model of agricultural research and development, which is seen, for the sake of convenience, to begin with the Green Revolution. The very success of the Green Revolution has led to such environmental concerns as water shortages, chemical contamination, biodiversity reduction, unsustainable production systems, and reliance on external knowledge. A few concerned NGOs and scientists have advocated local agricultural inputs consistent with natural cycles of decomposition and growth, with chemicals used only as a last resort. Requiring higher labor and lower capital inputs than commercial approaches, and implying lower yields in many cases, the agro-ecological approaches have the dual benefits of educating development specialists about alternatives to transplanted technological solutions, and of approaching sustainable agriculture to a greater degree than is evident from capital intensive approaches. In addition, the approach allows a producer to participate with neighbors according to the existing culture and to make personal decisions. However, *agro-ecological approaches in this guise are essentially a refinement of intensive commercial agricultural approaches, and therefore retain risks to subsistence farmers being brought ill-prepared into an expensive credit-based form of commercial agriculture that can lead to loss of land and food security without compensating rewards*.

Other commentaries are similarly cautiously optimistic of continued improvements in average food security, while noting that access to food is a continuing constraint to real food

security.[116] The above 'emerging issues' will impact on such models in unforeseen ways, and have been highlighted by IFPRI to place a context around interpretations of the model. However, such models do not focus on smallholder self-sufficiency in agriculture, and this precludes their application in specific food security situations. In addition, other critical factors related to food security and environmental care are apparent, including:

- Grain volumes stored across years
- Agriculturally induced environmental degradation
- Human and ecosystem rights in an agricultural context
- Differing policy requirements of subsistence and commercial agriculture
- Self-sufficient agriculture as the essence of food security
- The role of food as a basic right before its consideration as a commodity
- Environmental protection.

These points are amplified below. To ensure 'informed confidence of all persons in a self-identified group within a society of their ability to access adequate nutritious food for their families at all times' requires an understanding of food as more than one among countless traded commodities, and its production as more than an industrial process, even though those views may be useful for commercial agriculture. Broad consideration of food security can be undertaken within an economic paradigm, although this requires a broader perspective of economics than has been common in recent decades. Concerned scientists may better seek understanding of the context of their work within the philosophical and religious

[116] FAO (2001)

understandings of humans that complement everyday economic research.

Wider Aspects of Food Security and the Environment

The Role of Grain Storage

International free trade discussions can easily lead to assumptions that regional crop failures can be remedied by grain supplied from unaffected areas, rendering grain stores obsolete. These arguments are based on observations in Western countries and the cost of storing grain. Past policies for grain storage have relied on ancient observations of cyclical weather, and in some cases, the ability to manage market prices by controlling large volumes of a commodity. Arguments for storage as part of human interaction within nature are being eroded by the arguments of free trade that focus on the obsolescence of storage as a price controlling mechanism in a global market now oversupplied at the price levels desired by MDC traders. One logical outcome might be for LDC governments to assume responsibility for storage, but this appears to be precluded by inability to pay, alternative priorities, and the high costs of inefficiency and corruption in some countries. On-farm and local grain storage in LDCs rises in importance with such global changes. In any case, the outcome is that food insecure persons are rendered even more so by the global reductions in grain storage[117] that are now at the lowest levels ever, having fallen below the reduced target of 16 percent of annual production to 14.2 percent.

[117] FAO. (2000) Page 11.

It has been argued that 100 of the existing 650 million tons of grain fed to livestock can be considered to be a reserve for human food needs. Calling on such a 'reserve' would initiate competition for access to food of an unprecedented order. To take some extreme and simplistic approaches: a global catastrophe would mean no reserve at all, as all standing grain would be affected; a catastrophe affecting India and China would allow say 120 grams of grain per person per day from the 100 million tons, or perhaps 780 grams if all feedgrain could be diverted – but commercial imperatives may easily preclude such generosity. FAO takes a more realistic if necessarily macroeconomic view that considers regions and countries capabilities; however, the concept of storage is more than one of price manipulation and global averages of availability because it contributes to confidence that one has sufficient food for one's family. The issue of grain storage as a component of food security at national and international levels remains relevant, and the role of on-farm or local storage is of prime importance in ensuring local food security.

Agriculturally Induced Environmental Degradation

Mis- and over-use of some Green Revolution techniques produced environmental degradation, although one might argue that the rising population was the base cause, and that current knowledge is an unfair basis for criticizing past actions. Nevertheless, continued use of damaging techniques in areas where food supply is adequate is now untenable. Environmental degradation in LDCs continues, particularly in such forms as deforestation to create new agricultural lands, salinization of irrigated areas, and depletion of marine fish reserves.

Deforestation threatens biodiversity, increases soil erosion risks, and disadvantages the rural poor who depend on food, fiber, medicine, or income from forests. Rates of deforestation may be declining as forests themselves decline; in the 1980s, some eight percent (11 percent in Asia) of global tropical forests were felled,[118] mainly to suit agricultural expansion. In agricultural areas, improper irrigation has caused salinization, which has reduced productivity and changed environments in other areas. Most analyses focus on the loss of agricultural land more than environmental impacts and indicate that up to 30 million hectares (12 percent) of global irrigated land is seriously salinized, and that more than twice this figure is moderately salinized.[119] Off-shore, fish catches peaked in 1989, indicating that extraction rates of the previous several years had exceeded sustainable levels.[120]

In considering agriculturally induced environmental degradation, it is most common for agricultural science reviews to focus on means of reestablishing lost capacity. This approach divides the world's 8.7 billion hectares into some 3.2 billion potentially arable hectares, on which crops are grown on some 1.5 billion hectares. The remaining 1.7 billion hectares supports pasture, forest, and woodland, which as it is not cultivated, is usually assumed to be closer to a natural state. However, pasturelands are usually so designated due to their low cropping potential often due to poor rainfall, which renders them sensitive to overgrazing; forest statistics include plantations to an increasing extent under management systems that may be better

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118 N. Alexandratos. (no date)

119 D. L. Umali. (1993)

120 L. Brown, N. Lenssen, and H. Kane (1995)

classified as crops than forests. Sara Scherr notes that 'in South and Southeast Asia estimates for total annual economic loss from degradation [on agricultural lands] range from under one to seven percent of agricultural gross domestic product.' Concern over loss of productivity over approximately 16 percent of agricultural land in LDCs, estimated for the past 50 years at 13 percent for croplands and four percent for pasture-lands, is recognized as diminishing agricultural income and economic growth, with its major effect being on the food security in those localities.[121]

Environmental 'decline' also results from natural phenomena, and can be exacerbated by population pressure. FAO's consideration of droughts in its food security deliberations[122] highlights such medium term effects, although it is usually assumed that affected areas will return to past levels of productivity. Our economically-biased concepts of sustainable agriculture have been mistaken for ecological sustainability and continue to cause confrontation between agriculture and environmental protection measures – a theme developed further in Chapter 8. Worldwatch Institute's[123] concerns that environmental decline may prejudice opportunities for expansion of agricultural production form part of this wider scenario.

Poverty is both a cause and an effect of environmental degradation, and continues to pose the most serious environmental threat in LDCs. Millions of subsistence farmers, who would normally protect their immediate environment and

[121] S. Scherr. (1999)
[122] FAO. (2000)
[123] L. Brown. (2000)

have minimal external environmental impact, will eventually exploit natural resources when their food security is threatened; this is entirely understandable, and blame should be allocated to the mechanisms which produce poverty rather than to the impoverished farmers, or farming itself.

Conventional economic development theory advocates 'accelerated agricultural intensification [as] a key component of the strategy to alleviate poverty and protect the environment … [and that] … contrary to what some will have us believe, agricultural development is part of the solution to protect the environment, not part of the problem'.[124] This can be true within the narrow arguments about the relative benefits of intensive agricultural techniques compared to traditional approaches in situations where population pressure has exceeded the capacity of traditional systems. However, one must take a broader perspective in a general discussion of food security, and at the global level acknowledge the causes of poverty in terms broader than incomes, and at local levels acknowledge the right of each person to a secure food supply.

Human and Ecosystem Rights in an Agricultural Context

Human rights to food are compromised by the withholding of food as a weapon, and even by our flawed assumptions of the adequacy of governance and legal systems and of the ability of competitive economic systems to deliver equitable outcomes. Compounding problems of access to food is the environmental

[124] P.Pinstrup-Andersen and R. Pandya-Lorch (1995)

cost of agriculture that requires poor families to use sensitive lands. While it may be attractive to argue for major revisions to international development approaches, commitment to the current approach is significant and unlikely to be influenced by non-competition based approaches. A more practical approach may be to work within the iterative LDC development model to guarantee human rights to local food security, before investment in industrial sectors, including export agriculture that targets higher-priced MDC markets. Such an approach would inevitably lead to consideration of community-based actions that create value from cooperation itself, as distinct from the adoption of some traditional elements to enhance intensive agricultural production systems.

Deep ecological viewpoints are usually anathema to agricultural arguments. Nevertheless, they are informative when placed in the context of evolving intellectual conceptions of nature, and the effects of human interventions. Roderick Nash's[125] history of the natural rights of nature itself, including humans, provides such a context for environmental ethics, at least in Anglo-Celtic cultures. He considers philosophical investigation of the moral relationship between humans and nature to be 'one of the most extraordinary developments in recent intellectual history'.[126] Social evolution from a pre-ethical past where self was primarily expressed through family, tribe, and region, is traced to current ethical concerns relating to nation, race, humans and to an extent animals, and future considerations of universal environmental ethics. Such change in moral perceptions is usually compared to the abolition of USA slavery in 1865 when slaves were no longer considered to be ownable chattels but humans with equal rights.

[125] R. Nash. (1989)
[126] R. Nash. (1989) Page 4.

Nash's expanding concept of rights compliments the evolution of ethics, and incidentally assists our understanding of the human and environmental rights expectations of international aid donors that seek 'good governance' in LDCs.

John Stuart Mill's observation that 'every great movement must experience three stages: ridicule, discussion, adoption'[127] may well apply to the ridicule attracted by doubts of the efficacy of solely technological solutions to poverty, food security and environmental degradation. However, some such ideas have already affected moral viewpoints concerning cruelty to animals for reasons as diverse as cruelty to animals demeaning concerned humans and the ascribing of specific rights to animals. Evolution of thought from the rights of living beings and life supporting matter to the ascription of rights to an ecosystem seems to be the next stage, with humans acting as spokespersons for inarticulate and abstract concepts such as ecology, mountains and forests.

Denial of natural rights produces moral outrage in Western societies. Liberation commonly requires the revision of rules that oppress a minority, which in Nash's arguments is nature itself. The rights of land and livestock, for example, conflict with long held concepts of human property, thereby providing a direct parallel with the 1850's movements that liberated slaves from being considered personal property. From the 1960's insights of Murray Boochin[128] whose arguments foreshadowed Rachel Carson's 'Silent Spring', philosophical argument of the 1980s expanded the manipulation of ecology to serve human dominance of nature through technological means of redressing

[127]R. Nash. (1989) Page 8.
[128] M. Boochin (1965)

negative impacts rather than prevention.[129] In so doing, sustainability arguments became commonplace, such as those that we commonly employ in supporting industrial agriculture.

From an LDC perspective, NGO and related institutional advocacy of traditional approaches to agriculture, and the dispirited farmers earlier induced to trust commercial promises, highlight the value of food self-sufficiency as the first priority of small farmers. Traditional community-based systems, and affinities with the natural environment echo some of the sentiments of the leaders in Western environmental philosophy, who are in turn introducing the factors which will probably modify our approaches to development in the longer term. If such similarity of viewpoints continues, agricultural science may well be revealed as having neglected its responsibility to ensure food security and environmental protection when it supported commercial agriculture to the exclusion of self-sufficient agriculture.

Policy for Subsistence and Commercial Agriculture

Agricultural policies in LDCs have reflected progressions in development thought, which has encouraged emulation of the wealth creation mechanisms of MDCs and thereby confirmed to advocates that there is a desire for global economic development.[130] But these policies may not represent the desires of all, nor may they consider their risks. Food security, once a general national objective, has more recently been subsumed

[129] Murray Boochin. (1980)
[130] Y. Biot, P. Blaikie, C. Jackson and R. Palmer-Jones (1995)

within industrialization policies that are in turn fueled by the pro-development arguments that group agriculture with other industries examined for international comparative advantage. This economic analysis allowed such conclusions as, 'a country should not pursue food self-sufficiency where the natural resource endowment is uncompetitive and where potential returns from export oriented industrial investment are high'. The resultant modernization based on foreign funds, which later widened to include private sector borrowing, investment and speculation, has created the excessive volatility recently experienced. Cash-cropping including contract growing in place of food-cropping, has thus exposed small-holders to food insecurity and global price risks.

As discussed earlier, foreign influence has visited successive development theories on LDCs based on false assumptions of adequate education levels, rule of law, and codification of moral values. With experience, awareness of the importance of basic human values, including the right of each person to food, shelter, clothes and health care,[131] produced locally oriented projects within national models aimed at Western-style agriculture. Yet the majority of agriculturists remain poor smallholders whose prime concern is family food security.

The conclusions from 50 years experience in the World Bank listed earlier may be summarized as:[132]:

A. macro-economic stability is essential
B. economic growth does not filter down to the poor
C. development policies must be comprehensively integrated
D. institutions must be socially inclusive and responsive.

[131] N. Long and J. Douwe van der Ploeg (1994)
[132] World Bank (1999)

Thus one might define self-sufficient smallholder agriculturists in these points as:

A. contributing to stability through feeding themselves – food security means stability in this context[133]

B. meeting rural human needs of food, shelter, clothing and health care before other needs

C. & D. acknowledging self-sufficient and commercial agriculture as having different institutional needs, which may include minimal interference in some agricultural practices - for example, perceived transition of power from traditional spirits to institutions has been shown to reduce the viability of communal actions such as irrigation and forest use.[134]

Self-Sufficient Agriculture Secures Food

Self-sufficient agriculture contributes to stability and food security and cultural integrity as is discussed in a later chapter. It may take the form of lost concepts being reintroduced, adapting approaches from other areas, or selectively modifying traditional approaches. The conclusion of Chapter 8 that we must recognize the existence of two agricultures in LDCs, self-sufficient and commercial, can easily show the former to be the larger sector if labor inputs are valued at common rates and the social welfare savings of self-sufficiency are considered. It is therefore the major component of global food security.

Viewed in this way, is food really just another traded good?

[133] I. de Soysa. (2000)
[134] J. Mulder (1968)

Food Before Commodity

So far, the argument for food security has brought together the disparate views of development practitioners and academics concerned with the sector, and the philosophers who interpret the evolving value system in which we operate. The basic needs approach to development that has been implied is common in NGO more than financing institution reports; however, if the right to eat is the same as the right to breath, as introduced in Chapter 3, then food security transcends the Universal Declaration of Human Rights, Article 25(1) - which simply states that 'everyone has the right to a standard of living adequate for the health and well-being of himself and his family, including food'.

As the main source of modern technology has been the West, our separation of natural science from the church over hundreds of years has influenced our views about the amorality of technology in itself, with its use by individuals or groups determining morality. However, the weakening influence of moral authority itself has revealed a relative morality emerging in Western personal life with society being governed by laws that similarly are reinterpreted each time morality shifts.[135] Through the period that this has occurred, the concept of stability has become associated with material comfort and the rule of law, with obvious success in material aspects of life. However, in terms of global food security, it has obscured factors that constantly undermine our attempts to meet humanitarian goals, even when based on the best information, models, and technology.

[135] R. Goss. (1997) Page 292-311.

One of the factors that limit success in humanitarian goals is that humans continually use food (and other basic needs) as military tools, and superior powers that purport to redress such inequities have probably attained their position through similar military or economic domination. The outcome of such compromises in moral behavior can be seen, for example, in inconsistent policies concerning domestic agricultural subsidies, development assistance plans which ignore population issues, and biasing of international market access. To treat food solely as a traded commodity is to deny the basic right of all to food, and such a circumstance inevitably forces cultivation of sensitive marginal lands and thus leads to environmental decline.

Environmental Protection

Protection of the natural environment from the 'collateral damage' of agricultural technology is presently conceived as a regulatory function on behalf of society. The amoral approach of science has allowed it to be viewed as benign and for we scientists to be trusted as informed persons on the subject of environmental side effects. This has occurred at the same time as our management and funding has shifted from mainly impartial and informed government modes, to a financial outcome orientation linked increasingly to commerce. The impartial roles of such bodies as CGIAR, which work to assist the marginalized persons of the world, become more critical in such a circumstance. However, in general, our credibility is slipping in the public's perception, and in modern democratic governance systems the response to environmental risk seems only to be increased regulation. We need therefore to consider carefully our moral stance in publicly advocating the use of potentially

dangerous technologies lest we be perceived to act on behalf of commerce, before society or the environment.

Environmental protection can be an outcome of food security in LDCs. Regulation is unlikely to be any more effective than it has been in the past when a basic human right – in this case to food production - is violated. However, technological innovations suited to environmental rehabilitation will also be developed, and in MDCs probably serve an industry based on rehabilitation itself. In the same manner that agriculture is better conceived as two separate activities - self-sufficient and commercial - so environmental protection may follow suit for self-sufficient food security, allowing protection of an environment while commerce sells environmental technologies in richer markets.

Re-Conceiving Food Security and the Environment

Food security, more than poverty alone, determines the degree to which the natural environment is protected. Our earlier argument continues to hold, that intensive agriculture allows the maximum residue of natural wilderness areas compared to less productive forms of agriculture being spread across a wider area.[136] However, while the production orientation is commercial, objectives of environmental protection are undermined when expected financial returns do not lead to food security, and agriculture must expand to other areas. This scenario illustrates the two most powerful forces of environmental decline in LDCs; food insecurity forcing families to abandon traditional values of the environment, and avarice encouraging the introduction of cash crops in place of household

[136] L. Falvey (1996)

food crops to peoples excluded from the full benefits of the economic system.

Conceiving food security as an average of food production on a global, or even a national or sub-national basis, produces conflicting policy initiatives, such as environmental regulations that must be flaunted in rural areas where food is insufficient as a result of farmers being coerced into cash crops. The increasing indebtedness of smallholder farmers in such situations continues to contribute to foreclosure over families' lands, and so creates landless farmers whose traditions of land care may no longer apply to their new situation as share-croppers or tenants, thus further contributing to degradation.

We therefore are faced with two apparently opposing viewpoints on food security. One view states that the world produces sufficient food now, and with appropriate research will continue to meet food demand as far as can be foreseen. The other view states that the causes of past and current food insecurity relate to inappropriate interventions in distribution and production systems. The IFPRI model produces the former conclusion, and the wider argument presented above, the latter.

IFPRI's conclusion, that LDC food production and imports must increase substantially, supports the need for research to increase yields, and to integrate aspects of agro-ecological approaches into intensive commercial agriculture. However, the risks to individual subsistence farmers in costly credit-based commercial agriculture are easily overlooked, and the past assumption that farmers will become a low proportion of the population seems to continue unspoken. Before self-sufficient small-holders who have been encouraged into commercial agriculture can be said to have

benefited, they require an income that exceeds the sum of the purchase cost of food, capital return on investment and operational costs of the commercial venture, risk insurance against price, weather, and other variations, and compensation for lost traditions and values that may increase community costs in the future. But nowhere does this basic principle of economics seem to have been observed in practice, and in any case, where such a situation exists, market forces probably provide the stimulus before development economists can analyse a new situation. Thus the focus for food security research, both technical and social, may better conceive its field application as a subsistence farm than a monocultural agribusiness. Our economic paradigm can be readily broadened if we so re-conceive food security as - *all persons having informed confidence in their ability to access adequate nutritious food for their families at all times.*

In re-conceiving food security, local grain storage is of prime importance, while national and international storage remain relevant. The millions of subsistence farmers would continue to protect their environment through traditional taboos on exploitation and knowledge of the capabilities of the resource and food needs of their families. This conception may be accommodated within the iterative LDC development model by simply acting on the universal human right to local food security, before investment in industrial sectors, which in this definition includes export agriculture in favourable areas targeting higher-priced MDC markets.

Once this human right is overtly acted on, the emerging forces of ecological rights among the influential nations might be assumed to dictate international assistance policy and so interpret 'good

governance' in all countries to include ecological sensitivity. The congruence of thought in traditional community-based systems and rising sentiments of Western environmental philosophy will probably modify our approaches to development as the influence of the commercial agricultural model recedes from government and development thought and moves towards its major commercial beneficiaries.

Current encouragement of commercial agricultural expansion to marginal areas continues to disrupt millions of poor smallholders whose prime concern is family food security followed by access to non-agricultural social services that will benefit their children. Nevertheless, commercial agriculture in socially and environmentally appropriate areas, including in MDCs, continues to service the food security of urban dwellers and the relatively less populated regions. This further supports the conception of two distinct types of agriculture; self-sufficient or commercial — with self-sufficient agriculture as perhaps the major economic sector of most LDCs. The distinction cannot be made by parties with vested interests, as the level of moral hazard is high when informed international corporations influence poorly educated LDC smallholders. It therefore is government, including its scientists, who should be the responsible voice to distinguish between self-sufficient and commercial agriculture, and where this is compromised, scientists remain responsible for ethical behavior, public education, and impartial government advice.

To conceive food solely as a traded commodity can easily conflict with the basic right of all humans to food, and thus make a mockery of any claims to sustainability. The argument made herein, that restricted access to food cannot be ethically

considered as an opportunity for profit-making, supports the consideration of smallholders separate from commerce. For smallholders, the best approach may remain that of food production for home use, sharing, and sale of any surplus, with income applied to socially beneficial outcomes – this is the daily reality for much of the world and may be sustainable. Commerce may find its better fields in wealthier markets for both agricultural and environmental technologies – and many of these approaches are already finding that sustainability is indeed elusive. Future food security and environmental protection may well focus on the imbalances introduced through competitive behavior over this basic right to food, as we learn from experience and seek to civilize agribusiness. So our worldview of rights and indeed of sustainability must change, as discussed in the following Chapter 6.

Chapter 6

From False views to Sustainability

self-delusion makes an art,
admitting but truths shallow

Our worldview, which assumes that equitable development and other desirable outcomes result from economic progress, may be challenged from both non-rational and rational perspectives. Systems approaches, now increasingly popular in the face of the apparent limitations of reductionist science, are themselves also limited, although they have shown that our analytical models based on assumptions of competition over finite resources are often wrong. And it seems clear to our culture, as it has been throughout history, that excess of material goods does not conduce to happiness. Moving from our current model which assumes material needs to be deficient, to one where, for example, personal psychological security is deficient, implies that global material needs may in fact be readily met. To achieve this, our infatuation with productivity must extend the 'rights' of rich country citizens to all people. However, there are other worldviews that are less optimistic and which see, on the one hand, the West sliding into barbarism arising from dissatisfaction, greed and competition, and on the other, conventional approaches such as market forces being able to solve all future problems. Other views that also invite consideration include utopian worlds, a focus on ancient values and individuals, and new conceptions of rights. So, in this period when everything is proving to be as uncertain as it ever was, improvement of global social equity

seems possible, but may be unlikely as our assumptions of an essential reliance on competition for limiting resources leads us to continue to pose sustainability as the catch-all answer to issues related to the natural environment.

Why do we misunderstand the realities of food security as discussed in Chapter 5? Does it mean that our economic paradigm is wrong? These and related questions are considered in this chapter, which links our false views of food and LDCs to our almost religious pursuit of means to sustain our comfort and privilege. In order to challenge our prevailing worldview that we have 'solutions' to the 'problems' of LDCs, we might first challenge our belief that resources or economic goods are inadequate and need to be increased. This chapter is a bridge between our partial views exposed in the preceding chapters and our apparent blind trust in 'sustainability' as a solution to modern environmental dilemmas – as such, it introduces a basis for understanding the illusory nature of sustainability in most of our modern agricultural research and development. It attempts this task by considering a miscellany of pervasive worldviews that memetically lead us to false views of sustainability; such views include our assumption of limiting resources.

From Resource Limits to Abundance

Let me begin by challenging the fundamental assumption of limiting resources, or scarcity as it has been explicated by Ulrich Goluke - a systems thinker who finds mounting evidence of inadequacies in commonly used analytical approaches and

models.[137] His worldview may not be immediately popular among those concerned with global inequities, yet in fact, it provides a means of refocusing the influential actions of the West towards greater global equity. Essentially, his argument begins with the question – 'if we have so much more than ever before, why doesn't such progress add up to satisfaction?'

The last half-century has destroyed much of the context for a belief in limited resources. Nevertheless, the habitual perspective has the aura of a fundamental truth – and this reinforces belief in the need to maintain access to scarce resources. It is from such a motivation that power bases have been built and continue to be defended. Yet, for example, assumptions of scarcity of land or food produce confused actions when it becomes clear that there is no current scarcity of food *per se*, but rather differential rights of access to abundant food. From such a realisation, it is possible to argue for greater discrimination between needs and wants as society and individuals move up Maslow's hierarchy of 'needs' from physiology, through safety, attachment, esteem, cognition, aesthetic, self-actualisation, and eventually to transcendence. Our question has now become, as Ulrich expresses it - 'how can you, your product, or your service help me realize my reason for being?' Once again, we seek an answer from an impoverished system; we may need to seek our lost heritage in the East, as introduced in Chapter 2 and as developed further in Chapter 10.

But our usual response has not been to seek transcendence of a materially constrained consciousness – it has been to seek means of protecting our 'rights' of continued access to material goods and security, or in a word, to seek 'sustainability'. This is why

[137] U. Goluke (2001)

sustainability has been understood primary within a productivity paradigm to date – and this is particularly evident in agriculture as discussed in Chapter 9. The future will be much more than the popular 'doing more with less', which may sound noble but in effect continues to assume scarcity. From a perspective of abundance, such a statement may become 'how do we do less' – and this may be 'sustainability', though we also have competing views about the future.

Decline, Progress or Reform?

So, what is new? Surely sustainability is already the catch-cry of our era. To understand the implications of such a fundamental shift, we can consider three options that seem to differ according to their appeal to different persons. The three are; the Conventional World, Barbarism, or Great Transition. Those who favour continuity of the Conventional World argue that the future is accommodated by market forces, policy reform, incentives and disincentives, and technological progress to produce improved environmental and social equity – this may be seen as the sustained technological research cycle described in Chapter 10. Those who favour the Barbarization view focus on the breakdown of social and other systems and foresee a fortress mentality developing, thereby producing inaction as the less attractive aspects of human nature dominate. Those of the third persuasion – Great Transitionalists - consider new worlds based on such approaches as eco-communalism, sustainability of all human actions and improved expressions of human nature.

We may return to food as an example to test these options. When we argue that nutritious food is scarce for say about one billion people, we know that there is a surplus for probably another two

billion people elsewhere on the planet. So, the informed person may conclude that access to food and the resources to produce it are inequitable, causing reforms in investment in food and development aid (Conventional World), or inaction justified by apparent resignation to the nature of the world with its consequences of starvation and war (Barbarism). Ulrich[138] would argue that neither view is correct as they both assume scarcity. Yet it is clear that we already have the technological and distributional capacity to rectify food imbalances, if we choose to do so – as discussed in Chapter 5. If we rose above our usual limited perspective, we could in fact realise that it is a choice as to whom we allocate a basic resource such as food, and its production. Such a realisation forms part of the view of the Great Transitionalists, and places them slightly closer to the insightful persons who clearly see the futility of patching a rotten cloth.

The interconnectedness implicit in this approach is clear. So is the message of history that humans are competitive and acquisitive, and that change is seldom sought. Nevertheless, the convergence of many forces may already be occurring in a similar manner to the initial development and expansion of agriculture. No-one chose to adopt agriculture on a large scale - it was simply a convergence of conditions that favoured a change.[139] The karmic implications of Buddhism accord with this reasoning, as does the realisation that we occasionally may see the changes we effect and by which we are influenced. Ulrich deserves the final word in this bridge between rational self-interested actions and reality - he says that, while it required millennia for us to 'feed the hunger in our bellies – who knows how long it will take to feed the hunger in our souls'.

[138] U. Goluke (2001)
[139] L. Falvey (2003)

This essentially Western analysis is refreshing in the increasingly uninspired and uninspiring technological laboratories that perform as anterooms to corporate boardrooms. I find the arguments attractive, and they are also strengthened by recalling the lost element of our vision, which as introduced in Chapter 2, may still be found in some Asian situations where they were well developed long before industrialised European culture emerged. If they formed part of our culture, it was at a time when the community was the principal identifiable unit of society, as distinct from the unit of today - the individual, who demands rights and privileges.

The Community or the Individual

The historical Western understanding of communities may be considered to share its basis with Asian cultures – a mutually beneficial network of interdependent persons sharing the requisite resources essential to the formation and sustenance of that network.[140] The Western separation from community approaches, and in particular from traditional law, which dates from the seventeenth century rejection of humans as naturally social beings, has condoned pursuit of personal interests.

In the process of these changes, diversity, cultural heritage, and community rights declined, and ethical behaviour became increasingly determined through legal regulation. Nevertheless, cultural differences pervade countries in early stages of material development, notwithstanding the increasing homogenising pressures of globalisation[141] as discussed in Chapter 3. Many of

[140] A. Dyck. (1994)
[141] Cholthira Satyawadhna. (2000)

the moral codes evident in religions which trace their origins to India assume, and have blended with, local community approaches to human organisation, and this is the reason that the arguments of Chapter 2 form the framework for consideration of the big issues for agriculture.

A community has no need for a special focus on individual equity as it is in-built into the operational code. But in the individual-based society of the modern West, there is a central need to define and police equity – and even then the selfishness that defines such societies leads to attempts to stifle other individuals' rights if such action can benefit us. This pessimistic view is a description of international aid that requires LDCs to adopt Western values and practices, and to contribute to the economic welfare of MDCs as a poor-cousin in the 'global marketplace'. Recognition of the immorality of this view is not new, as Whitman's lines remind us in *Of Equality ...*

as if it harmed me, giving others the same
chances and rights as myself – as if it were not
indispensable to my own rights that others possess the same.[142]

Many sweating and ploughing and thrashing, and then the
chaff for payment receiving,
A few idly owning, and they the wheat continually claiming.[143]

Adjusting the Development Worldview

Community may still be an Asian concept but its understanding in MDC decision-making on behalf of LDCs is poor - although

[142] W. Whitman (1996) Page 303.
[143] W. Whitman (1996) Page 725.

there may be some recognition of a need to change. Amrita Sen's[144] work on entitlements considered starvation in its simplest terms as not having enough to eat. By such as simple statement he was able to highlight the long-known but little heard fact that there is enough food in the world and that starvation is therefore the result of a solvable human folly. The unequal distribution of relief food, between and within communities, prompted Sen to consider the entitlement of families to sufficient food, and he concluded that the central issue was the ability to legally access food through home production, trade, equal opportunities before the state, and all other means.

So, starvation is ultimately a failure to ensure entitlements. This may be confused with a moral statement of all humans being entitled to food – a contention with which I agree and explain in Chapter 5 – but this is not Sen's argument; he restricts his arguments to what is possible in legal and other current practical terms. This may well be part of the solution by raising awareness of the rights that we in MDCs usurp from the poor in LDCs, but it is really just an explanation of our system, and thus neither revolutionary nor practical for the food-deprived person. To really adjust the paradigm, we must, as Chapter 2 and 9 argue, consider the breadth and depth of human knowledge – we must widen the breadth to include all of our knowledge, and deepen the depth by considering the insights of these 'unproductive' recluses that have been critical in all societies.

Aldous Huxley[145] eloquently describes the balance that recluses afford society, which when recognised by a society, supports its maintenance. With the extension of sustainability rhetoric to

[144] A. Sen (1984)
[145] A. Huxley (1947)

include 'sustainable societies', an interesting paradox becomes evident - the selfish orientation of our quest for sustainability is fuelled by continual material gain out of assumed scarcity, which seeks increasing material efficiencies. This devalues old-style reclusive academics, let alone spiritual seekers, to the point that they are seen as non-productive. In noting that such a society will reward the 'extraverted man of action', Huxley observes that the unprotected 'born contemplative … either dies young or is too desperately busy merely keeping alive to be able to devote his attention to anything else'.[146] Yet, it is such contemplatives in various guises that have often sounded the warnings of the association between environmental change and technology; as have sages of past eras.

In ancient China, Chuang Tzu related a parable of the rulers of the oceans in which the northern and southern rulers who often met in the realm of the central ruler and were well received, sought to repay the central ruler's hospitality. They observed that men had seven orifices for seeing, breathing and so forth while the ruler had none, so they dug an orifice in him each day – and on the seventh day he died. Huxley[147] explains the parable in terms of our imposts on nature, where upon attaining our objective we also reap other unintended harvests – we have 'turned dry prairies into wheat fields and produced deserts, [and] chopped down vast forests to provide newsprint demanded by that universal literacy which was to make the world safe for intelligence and democracy, and got wholesale erosion, pulp magazines and [various] organs of … propaganda'. The lesson is that seeking some stable and happy state external of oneself can only produce more of the very suffering that we seek

[146] A. Huxley (1947) Page 25.
[147] A. Huxley (1947) Page 91.

to escape in searching for sustainability – and lest this conclusion offend, Chapter 9 provides a fuller argument. Pride in our ability to manipulate nature into a 'sustainable' production system for our own ends leads only to the fall – as Christianity teaches, and which, portrayed as human insolence in usurping the role of the gods, also formed a recurring theme of ancient Greek cosmology.

To be very clear, let me express this in simple terms of good and evil - good may be seen as the disappearance of the self into the natural flow of reality, while evil is perpetuation and increasing of the illusion of the self as separate from that natural flow. Within the flow, everything is sustainable, and indeed in one sense, we may say that the natural flow of reality is 'sustainability'; seeking to sustain anything based on the illusion of separateness must only produce the opposite of sustainability. I call this the law of nature – if it accords with the natural flow, it is sustainable; if it doesn't, it isn't.

But our modern quest for sustainability is more selfish and less in accord with the natural flow; it can also be seen as an attempt at immortality, and as such, represents an example of fearing our inner feelings of the true order of reality under the influence of selfish tendencies. For the fear of unsustainability is just one more expression of our universal fear of death. A Buddhist would recognise this as the denial of reality that produces the suffering that characterizes the everyday world of *samsara* simply because we fail to accept the reality and live within it - that is *nirvana.* But the message is the same in every religion, though it is easily obscured by self-serving literalism. The humanist Huxley expresses this - 'immortality is participation in the eternal now of the divine Ground; survival is persistence in one of the forms of time.' By clinging to an illusory version of reality,

the majority of us are 'compelled to choose some purgatorial or embodied servitude even more painful than the one [we] have just left'.[148] Searching for sustainability in this paradigm must therefore be never ending and painfully attended by disappointments.

So it seems there is little chance for the paradigm to shift, either to Urlich's view or to Huxley's, let alone to that of the broader and deeper insights of the detached recluse. Or is there? One way to consider this further is to review how we reached such a conflicting situation.

The Path Well Travelled

To appreciate this argument, a short, and probably contentious, review of our history is helpful, as presented in the following. Beginning more than 300 years ago, Galileo and Newton provided foundations for the mechanistic model of the cosmos common to Western understanding. That mechanistic approach produced the industrial and technological orientation of our society in social, political, and economic terms as the West progressively accepted a wholehearted orientation to materialism. Regardless of ideology, materialism is based on the reductionist approaches of science, which assumes that all matter can be understood from such unity analysis. However, as has always been argued by an uninfluential few, understanding every component of, say, a flower may provide detailed scientific information about every component of that flower, but nothing of the essence of the flower.

[148] A. Huxley (1947) Page 242.

Bede Griffiths[149] uses the example of music being reduced to vibrations in strings for reproduction without any appreciation of the components of music which captures its spirit. Physics has focused on mechanical laws and chemistry on manipulation of the 'building blocks' of everything – thus biology has assumed these laws and explains living forms in terms of physics and chemistry, effectively viewing life as mechanical. Human health illustrates this system in terms of its mechanistic approach to treating ill health through specific interventions, separated from the spirit of a person.

In agriculture, it has been common to separate discussions into soil, plants, and animals on one side, and disciplines of physics, chemistry, bio-chemistry and economics on the other side of the two dimensional matrix. This has similarly reduced understanding of agriculture to a mechanistic base.[150] It is now a daily occurrence that cells from agriculturally important plant and animal species are manipulated separate from their species in order to test their expression of commercially useful characteristics. The fact that the expected result is not usually fully achieved in field practice may be traced to a loss of perspective of the 'whole'.[151] However, our blindness is not restricted to the methods of our science alone; it also leads us to consider 'agriculture' as if it was an entity in itself, rather than an unintelligible complex of dynamic interactions.

One neglected component of agriculture is humans, beyond the roles of consumers and farmers. Attempts to consider persons in agriculture in reductionist isolation, be they farmers, those

[149] B. Griffiths (1992).
[150] L. Falvey (1996)
[151] R. Beilharz and G. Nitter. (1998)

concerned with agricultural inputs, consumption or processing, can encourage self-oriented actions that are socially and environmentally unaware. For example, flood irrigation in areas with underlying salt profiles readily allows salt to rise to the surface through capillary action once a continuity of moisture is formed between the soil surface and the salt layer. It is obviously not in the interests of an individual irrigator to retain such salt on his own property, and flushing of excess salt, while requiring additional water that may have alternative ecological or human uses, moves the salt downstream where it affects other irrigators, consumers and other components of the environment. Such instances are prevalent throughout society and reciting them here will appear as facile as the salt example. However, the very fact that such responses are prevalent and that their observation appears facile illustrates the degree to which we are attuned to compartmentalised actions, decisions, responsibilities, and even solutions.

Naïve and facile as the above view may seem, it is an illustration of the consequences of our individual and societal actions and motivations. It appears even more naïve to mention it, when one looks at the benefits that have accumulated from orienting science, thought and even ethics to material management and gain – because, the material improvements of this approach are indeed extraordinary. In a field once of paramount importance to humans - when food was indeed scarce - today's agricultural technology and its underpinning science with its daily 'breakthroughs', hardly create a ripple of wonder in a population now dulled to technological advances in such a mundane field. Its ongoing technical solutions to its problems are assumed - assumed at one level through ignorance or unconcern in the general populace, and at another among informed persons,

including scientists, as axiomatic on the basis of prior experience. They seem to say 'eat, drink and be merry, for technology will continue to produce more food and to protect the environment' - and the sun will rise again tomorrow!

Three centuries of this materialistic approach has produced this current situation. It has also produced an unexpected rise in uncertainty, distrust of authority, and a searching for meaning, which some persons - particularly the Barbarianists discussed above - even consider as heralding the end of an era. Others express concern at the depletion of material resources such as natural fertilizer reserves, at widespread pollution and anthropogenic ecological changes, and of course at our excessive propensity to apply technological expertise of the era to weapons of mass destruction. Of course some concerned parties have begun to sound warning bells and to coordinate responses and alternatives to further mechanistic development; the organic model of the universe encapsulated in the Gaia[152] hypothesis appeals to many, often for no other reason than feeling that it contains an essential lost truth. It is still fashionable to dismiss this in the applied areas of science as an emotional response - as if emotions, including intuition, are inferior to rational mechanistic explanations. However, it is also possible to interpret this as an inherent spiritual understanding long suppressed to the point of individual discomfort, which is now stimulating some persons to act, or at least wonder. The realisation that something feels inappropriate may in fact be the saving grace of science and technology, whether or not we are indeed entering a new era or just continuing an old one.

[152] J. Lovelock (1991)

Great societies of the past were built on traditional wisdom derived from human spiritual connections with their surroundings and conceptions of the world and the universe. Agriculture was practiced not only in accordance with the seasons and variations between years, but also in recognition of cosmic forces too complex to understand and therefore allocated religious or spiritual meaning - which is termed 'primitive' in today's parlance.[153] But the traditional wisdom produced in the period of humankind's greatest advances in comprehensive understanding of around 2,500 years ago, identified the components of humanness that are essential to effective understanding and overall health. These three dimensions, physical, psychological and spiritual were viewed as totally inter-related, integrated and inter-dependent. They have been lost to the force which has become dominant through technological power in the present era; they were available for rediscovery in the Renaissance, yet were swept aside as scientific advances assumed precedence. The understanding of the critical aspect of inter-relatedness periodically resurfaces, as it has over the last 100 years, as described by Huxley as 'the perennial philosophy'.[154]

This does not mean that our current conception of the universe is totally wrong. It means that it is partial and much more highly developed in the material sphere than the psychological, which is now rapidly gaining recognition in the West - and that this in turn is more developed than the spiritual sphere. Our age is one of great technological advance - who would disagree? Yet these very advances coupled with the denigration and demise of spiritual considerations has meant that the gap between these

[153] L. Falvey (2000)
[154] A. Huxley (1947)

two is greater than it has ever been throughout human history, which viewed in the rational terms of our age can only mean that such inter-related and inter-dependent components of humanness are at a worse stage now than in pre-agricultural societies. I understand this as the law of development – a society with the better balance of material, psychological and spiritual activity must be considered more developed than one with gross imbalances, regardless of the novelties produced by excessive occupation with one factor.

Those pre-agricultural societies, such as hunters and gatherers, maintained an inherent balance between the material, psychological and spiritual world, not through any planned program, but because they simply observed that this was 'the way things are'. Even with the advent of agriculture, the spirits of places, plants, and animals were acknowledged in ceremonies, actions, and respect for the cultivation and growth processes through to consumption and storage of agricultural produce. Artwork reflected the spirits' role in crops and animals, and agriculture was a sacred pursuit conducted under the auspices of the religious conceptions. The mysteries of life and the universe were encapsulated in the actions of agriculture, recorded in the creativity of utilitarian vessels and tools, and developed through the written word as societies evolved. Such artistic and cultural traditions continued, notwithstanding the supposed setbacks of the Dark Ages, until the nineteenth century when science assumed dominance - some might say the beauty in art declined with this decline in spiritual awareness. If a new age is dawning, we should expect it to have something to do with this lost spirituality and its expression in work, art and imagination.

Such a new age may well be based on a redefined human relationship with nature – and agriculture is a prime example because its field practitioners, who numerically are overwhelmingly subsistence farmers in poor countries, have in the main, retained a feeling for the earth and their work as part of a natural way of being, unlike their disproportionately influential modern scientific counterparts and advisers. If our widening awareness leads to any action, it may take the form of a reconnection with the vestigial traditional wisdom of primitive societies. I feel that this, in part, explains the rapidly rising influence of Eastern religions in the West - a desire to re-establish a spiritual interconnectedness that has been largely lost within the Christian church. As we see ourselves increasingly as part of an all-embracing organism, agriculture will be practiced on a totally different basis - sustainability in agriculture and other fields will take on a totally different meaning, such as care for that which is part of us rather than simply maintaining an ability to produce a desired output. At the same time in such an ideal world, decisions that society anguishes over, from contraception to cloning to abortion, will be easily resolved by considering real motivations and needs. In agriculture, genetic modification, very intensive cultivation, physical and psychological mistreatment of animals, and measurement of success in terms of fiscal efficiency or production could well disappear. Such a vision of sustainability in agriculture might well be described as agritopia.

Agritopia

In utopia terms, large-scale agriculture might make way for smaller scale farming as all persons realise the spiritual nature and benefit of engagement in the natural processes of their own food production. Technology would then be used in a manner

appropriate to needs. Rather than technology being developed to serve a single-minded commercial end and accepting some co-lateral damage, it would be oriented to supporting spiritual development. Such a vision accords with and goes even further than the 'ecotopia' described by Callenbach.[155] Wisely considered from a perspective of balancing human psychological, spiritual, and material needs, the application of technology would be determined on the basis of maintaining that critical balance. Global inequities would disappear as the objectives of all actions were related to each individual being able to balance spiritual psychological and material needs, and respect for human tasks would rise disproportionately above the outputs of machines. In agriculture this would be a simple and huge magnification of the expected value put on hand-tended organically produced products, and on the value of products from poorer economies.

In this agritopian society, the beauty of harmony in nature would be understood in art and in action. Human products using natural materials would assume values far in excess of industrial products, and technology would allow passive use of the most directly available energy, the sun. Rather than rely on solar created products naturally processed into fossil reserves such as oil, direct use of sunlight without interfering with ongoing life processes would allow individuals to enjoy their greater contact with nature through decentralised and, if desired, attached dwellings. Large cities, themselves a bi-product of the industrial revolution, would soon be seen as unnecessary and costly. Village life in less developed countries provides a testament to the viability of this aspect. Inequitable global economic structures may be perceived as the reason for LDC poverty, but the

[155] E. Callenbach (1990)

demonstrable happiness of these people is not a reflection of either poverty or exploitation, and contrasts with our own society where the pursuit of happiness is effectively defined as material acquisition or diversionary entertainment.

Serving such a utopian society would be an integrated education base which returns substance to the ubiquitous, but now jingoistic, school mottoes of body, mind and spirit, and more correctly translates the mind component to include soul as was possibly the intent of Platonic discourse. The institutions which have grown from spiritual insights in various cultures would be compared to their current system-serving forms, and congruent insights seen as a 'perennial philosophy' that supports balance of spiritual, psychological and material aspects of life. For the powerful countries of today's world, which are largely associated with Western culture, this would mean a revitalisation that could lift us from our underlying need for diversions to keep away a pervasive feeling of anxiety and insecurity. From an agricultural perspective, a return to human involvement with the spirit of actions in agriculture, and the imminent spirit in all living and life supporting matter, would re-define agricultural science. This utopia may seem to be a reversal of present human values, but may also be seen as a re-balancing of essential values, both present and lost.

Such a utopian world might return us to human values that have demonstrably supported human survival and development for ninety-nine percent of our race's existence. It is natural for us to compare such a dream against recent history and current directions, and to see it as childish. However, our understanding has been progressively and seriously diverted from the integrated approach essential to humans and determined in that

great period of development 2,500 years ago. In separating ourselves from nature when we are really part of it, we have suppressed forces within ourselves that would otherwise have been held in balance naturally - these are the forces to which all major religions refer, not simply moral guidelines for human behaviour or areas for policing activity. These religious messages illustrate the folly of developing and maintaining imbalance between spiritual and other components of humanness. Such forces work at a level that we are unable to discern and their imbalance produces such outcomes as gross global inequities, an accelerating need for jails, police, armies, and weapons, and as a by-product, stultification of institutionalised religions as they are captured by the mechanistic and materialistic approach of the current age.

Seen from this perspective, the warnings of the Book of Revelations of 'wars and rumours of wars', and similar passages from other prophets of all religions, will suggest to some that our current age is most likely to follow its spiritual demise with economic, social and organisational collapse, from which might rise that new age. Yet, the seeds of this new age have always been present in the nurture of spiritually oriented persons in all cultures. The essence of agriculture, which was the first and most fundamental human societal activity, and the one that provided the initial freedom for individual spiritual development, will likewise assume an importance as it is re-assessed as a spiritual activity – with technology oriented to supporting such an objective. Farmers in poor countries have much of this balance in their lives, where they have not been coerced into risky commercial approaches - and surely the balance of all aspects of life are the right of all persons.

A 'Rights' Worldview

Earlier in this chapter I mentioned Amrita Sen's[156] Nobel Prize-winning work on the alienation of rights from poor persons as the cause of famine. Such a definition of 'rights' is a wise and broad interpretation that contrasts with the rising popular view in developed countries where it seems to be assumed that 'rights' refers to individual privileges. In fact, such appropriation of rights to an individual lifestyle regardless of its effects on others is in fact a denial of rights to those who must support that lifestyle as a result of their lack of power to change their position in the material allocation system.

To discuss rights in the context of a worldview, it is salutary to note that within our Western society, rights were once linked to responsibility – the more 'rights' or privileges that one inherited and acquired, the greater the responsibility that individual was expected to accept in social terms. This is seen by some as an imperfect approach since those with more privilege, such as in a colonial regime, seldom had sufficient knowledge to produce the outcomes that they sought on behalf of their 'charges'. Such criticism is cheap – and from today's vantage point could only be credibly offered by those who also see that our current more democratic system shares the same flaw of allowing decision-making separate, in the form of electoral representatives and voting procedures, from education and knowledge. Some might argue that this is a reason for broadly based education in all countries, but, to paraphrase Dorothy Parker – *you can lead the hoards to water, but you can't make them think.* And, while it may seem facile to say that 'nothing is good or bad but thinking

[156] A. Sen (1984)

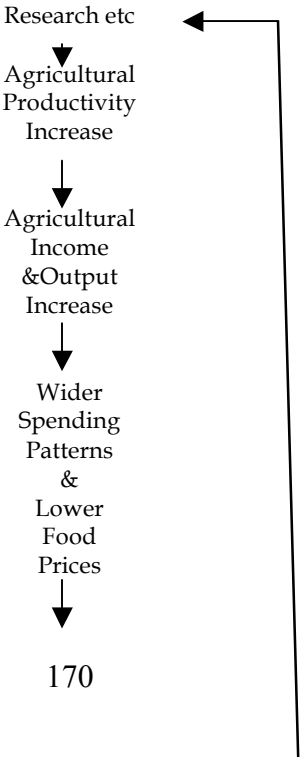
makes it so', in fact great religions and philosophies all seem to warn against following the whims of those who do not know their own minds.

Understanding one's own mind would seem a logical outcome of an individualistic culture such as our own, though it seems we have rather adopted the alternative of continuous diversion from such understanding. Coupled with this, we have allowed ourselves to become comfortable with our morals constantly being modified as new information and technology enters our consciousness, thus further alienating ourselves from ancient wisdom. The contrasting utopian vision of the preceding section has, of course, never been achieved on a wide scale - but then neither has the utopian ideal of sustainability that we so easily invoke today. So how could we consider either to be possible? One answer lies in the individual as the crossroads between ancient wisdom and modern views that the rights of one's self, or of our collective selves within an economic unit, exceed those of other persons.

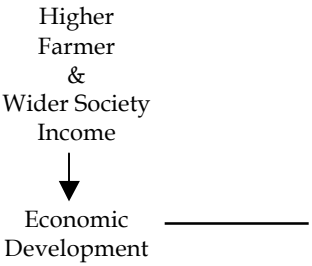
International inequity often stimulates altruistic reactions by individuals. This might even be seen as a 'calling' in the same terms as missionaries use the term, although I would reject most other similarities. However, as noted in Chapter 5 and elsewhere, the interrelationships of multiple factors make complete understanding of the processes of development impossible, leaving only general trends to guide institutional decision-making. But, as is argued in Chapter 10, the rational knowledge of institutions is not the only source of knowledge; experiential knowledge beyond codified information remains an individual matter - and this is the knowledge that comes with deeper insight, higher consciousness, enlightenment, or whatever it is

variously called. This is where the knowledge and values that effect attitudes to rights in individuals and institutions may clash.

For individuals 'called' to assist equitable global access to the four basic needs of food, clothing, shelter and basic medicine, the commonly assumed 'engine of growth' model to development, beloved of agricultural scientists, is ultimately seen as both wrong and as undervaluing agriculture itself. This is curious as the proponents of the model, among which I once counted myself,[157] usually see it as a means of promoting the importance of agriculture. The model may be presented as the following flow chart, which shows increased production from agriculture creating wealth for all in a relatively balanced cycle.



[157] L. Falvey (1996)



An assumption of the model is that development in LDCs will follow the economic paths of MDCs, which, in some respects, does seem to be the case. However, accompanying this development seems to be an adoption of MDC value systems, complete with 'rights' separated from responsibilities, which is becoming evident in various ways, including attitudes to the natural environment. If the MDC model of development relies on guaranteed access to resources from LDCs, then surely that model is not available to LDCs themselves. Perhaps the most honest means of understanding the model of international development is to assume that while more overall wealth may be created, the relativity between nations will not change substantially.

The albeit rare individual described earlier as possessed of insightful knowledge may cut the Gordian knot that ties nations, groups and people into a perpetually inequitable relationship. Such an individual might be seen as operating at a higher level of consciousness, which enables understanding that the routine compromise solutions must always produce new issues, and that only understanding of a broad picture and actions unattached to personal desires can lead to effective outcomes. Where are such

insightful individuals to be found? In my limited experience, such individuals often tend to work together, and while they may see the futility of unintegrated actions and thus decline to waste time on pointless activities, they are usually viewed as unproductive by the influential majority. However, the conclusion seems inescapable that our everyday actions, conducted in the usual mental state of mixed motives and clouded judgement, cause us to accept compromises that we may otherwise know in our moments of insight to be worse than inaction.

Such everyday consciousness can therefore only be effective when it approaches higher levels of consciousness. Perhaps this is why some small-scale projects are more effective than large ones – of course this is not an absolute rule, but it is a clear tendency, and suggests that insightful persons might be sought in successful small-scale activities, working with other individuals who understand that development begins with balanced development of material, psychological and spiritual components of life rather than material aspects alone. This will seem such a weak and non-intellectual viewpoint that it will probably alienate academic consideration – for most concerned persons consider that the apparently objective review systems of, say, institutionally based international development projects surely offer a perspective of relative success! Yet, 25 years experience tells me that honest reviews by MDC professionals of institutional development projects in LDCs are too much to expect, and perhaps even impossible to produce because informed reviewers, where they exist, are considered biased, and the more usual partially informed specialists cannot understand a specific development situation in the short times allotted - even

if they claim to. This implies that inconspicuous contingent effects may easily be overlooked.

An example of this situation is the environmental degradation that results from human excesses in turn producing environmental concern, which stimulates us to require that the environment be repaired; this may last until complacency allows some action that again damages the environment, thereby perpetuating a human induced cycle. This cycle should not be confused with the argument that environmental damage has been exaggerated through misuse of scientific statistics.[158] But it may then be seen as an inevitable outcome of human desire for sustainable comfort and security in the face of inevitable effects of other human desires driven by greed and ignorance, and even a deluded conception of the nature of the world. Some may argue that this seems a natural form of human behaviour, and being natural should be accepted and only modified when the cycle seems to have broken down. I can accept this basis of action if it is accompanied by its corollary of the conditions and effects created by those taking the initial action – this is an argument that leads to acceptance of the disappearance of humans if this is a logical environmental consequence of human actions – which incidentally makes nonsense of most attempts at sustainability. However, this is not usually the way it works, and such a perception offers little consolation to those caught in the downside of the cycle. Of course, the cycle itself a simplistic concept suited only to limited purposes of communication – yet it is, in fact, an unstated assumption of the Western economic model, which seeks to boost the resilience of MDC economies by 'sustainable relocation' of risky downside effects of the cycle to

[158] B. Lomborg (2001)

less influential LDCs. This is why polluting and dangerous industries are said to be migrating to LDCs.

How does all this relate to the individual's worldview? In practical terms, we may look to the moral base of concerned individuals. This is not a simple acceptance of the United Nations' or other charters as one's own moral statement, but a morality based on personal reflection which is acted out in every aspect of one's own life informed by a higher state of consciousness. This is the teachings of millennia; as shown in Chapter 2, such principles were once inseparable from other knowledge, and that very difference from our actions of today is probably a major contributing factor to our social and environmental ills.

The above line of thought suggests that the usual shifting moral base of the modern West can only lead to a shotgun approach of partial remedies without commitment. If we are to be practical, we must rely on individuals not institutions. Again, this sounds naive - yet it seems more in accord with the real world than are our current approaches. LDC community values can assist where these retain some of the practical approaches of past insightful persons, and encourage all to develop their own spiritual and psychological development in balance with material development. Such acknowledgment forms part of the so-called 'systems approach', which while seen as better than reductionist approaches by its advocates, tends to commodify spiritual and psychological aspects as two more material goods.

In terms of 'rights', the compromised views from MDCs end up mixing such matters as free-speech and gender equity with more basic rights such as confident access to food, shelter, clothing and

basic medicine as described millennia ago, and as confirmed daily by marginalised people.

In canvassing some of the apparently false views of our times, we might for the sake of argument, consider the following scenario:

- We live in a period of abundance, unlike previous periods
- The rapid change in technologies, lifestyles and morals causes us to see - according to our views - our civilisation as declining, progressing, or reforming
- With the decline of community many past values and stability systems have been lost
- The ascent of the individual as the unit of modern society may encourage selfishness and usurping of the rights of other persons
- The focus of millennia-old conceptions of human development to the highest potential through spiritual development is the individual person
- Utopian proposals seldom eventuate, but can stimulate a path for progress
- Sustainability may be seen solely as a utopian ideal, but has been literally interpreted and acted on as if it is indeed attainable.

In such a confusing time for government, the wisdom of the insightful individual is the most valued 'commodity', to use the prevailing rhetoric of today - though it is so often 'withdrawn from the market'. Confucius reputedly followed the dictum of resigning from government service when the regime was corrupt, and if we accept that breaking from historical lessons and morality is consistent with the connotations of 'breaking' in the Latin roots of the word 'corruption', then perhaps it is true that 'a good man may not [always] be found in government'. I do

not find this logic to be absolute because the dualistic nature of the above argument is simply a device to allow discussion; individuals are not either insightful or not, they exist at all stages, and each person has different moments of insight. It seems that the excesses and nonsense that accompanies the 'corrupt regime' provides stimulus to many to reflect on the wider impact of actions and life in general, and that insightfulness or at least moments of insight can arise from such reflection.

But nevertheless, in our less insightful moments, which for the vast majority of us may be our primary conscious state, we delude ourselves if we think that our scientific understanding allows us to permanently control any aspect of nature, such as 'sustaining' our desired outcomes from agriculture. This delusion, which by definition makes sustainability an illusion, has pervaded the unreflective professions, which now see sustainability as the answer to political, economic and most other issues. To derive 'sustainability' from such false views would be pointless, so this apparent anomaly deserves our further consideration, which is the purpose of the following chapter.

Chapter 7

Sustainability is the Answer! – What was the Question?

we crave our touch will life imbue
and in our quest we poison

Much of our emphasis on sustainability, particularly in agriculture, aims to sustain profitability from the use or consumption of natural resources, rather than, for example, to sustain environmental integrity regardless of its component utility. If profit is sustainable, then we assume that the underlying resources must have been sustained! So the question that we assume is being asked is something like - 'how can we maximize profitability while minimising impact on the environment?' While this may be a valid question within certain confines, it seems that society is increasingly asking - 'how can we produce food without harming the environment?' The answer to this second question allows consideration of sustainability separate from profitability, and allows more realistic consideration of low-impact and supposedly zero-impact technologies as well as small-scale agriculture with its contact between the producer and nature. A third possible answer from a global perspective allows consideration of trials conducted in Asia and elsewhere to reverse the trend of migration out of agriculture to non-productive urban roles. Bacon's prescient observation that our actions work on the 'matter and spirit of the created world, including the minds and passions of human beings' reminds us that our own preconceived and self-serving ideas of sustainability may not be within that natural spirit.

A recent CSIRO meeting in the Australian Parliament House concerned industry partnerships for sustainability and began with a metaphor from the Chief Executive, Chris Garrett –'I didn't know how fast I was going until I tried to stop'. This might be construed to mean that our technological research and development complex, by continuing its accelerating path of discovery and demanding activity, may be missing some elements essential to sustainability. If that was his meaning, it accords with my conclusion that it is probably impossible to conceive sustainability without stepping aside from the fast pace of science and the focussed attention of its supporting structures. In this way we might gain a perspective as to whether sustainability is elusive, as suggested in the repetitive quest of technological research, or in fact illusory, as suggested by ancient wisdom.

Such a view also seems to accord with the conclusions of the John Elkington, the UK-based advocate of sustainability in industry and keynote speaker at the same meeting. He postulates the emergence of new and influential organizations concerned with sustainability in each of the private, public, and not-for-profit sectors. One might go further and include new approaches initiated by individuals whether they are within institutions or not, for in each case, there is a growing gap between corporate perceptions of environmental performance and those of the informed public. Elkington illustrates the point from a survey of company analysts, investors, journalists, and company employees grouped as investment relations managers (IRMs); the first three ranked company information on environmental, social,

and sustainability performance as mainly 'poor', while company-based staff liaising with these persons and the public (IRMs) ranked information as mainly 'good'.[163] Some of the gap may be a failure of communication of company actions, but the implication is clearly the opposite. An inevitable sudden realisation of changing social attitudes suggests imminent and major change in corporate approaches to sustainability.

In a sector with which I am a little more familiar, the parallels might be expressed in the following way. Research and education oriented to sustainable agriculture, farming practices, and the structures of agricultural industries (including their supporting governmental and political organizations) reflect past social values and are only adapting slowly while the pace of technological output supporting the past paradigm continues to accelerate. As society becomes aware of the token nature of many current approaches to sustainability as an addition, rather than an alternative, to current approaches, sustainable agriculture may well assume a new meaning.

Sustained Research

Elkington forecasts the rapid transition of well-managed corporations to include environmental, social, and sustainable considerations in all decisions and actions. Such corporations are to be characterised by strong ethics, sustainable business models, and constant innovation. The last of these - music to the research industry's ears - seems therefore to have a secure function critical to our society obtaining something akin to its expectations of sustainability. The critical role of research in this majority view of

[163] J. Elkington (2001)

sustainability is compared to a known, yet probably largely unacceptable, alternative in Chapter 9.

Quoting Josephine Green of Philips, Elkington adopts 'sustainability [as] the vision of advanced capitalism', thereby exposing the underlying assumption that capitalism provides the only viable context for sustainability. This may well be so at this time – I don't know. If so, it may indicate one more small step towards humanising corporate and government approaches within capitalism, or whatever materialist rubric under which we structure our society. Thus we appear to have committed ourselves to learn from our mistakes as we go along, thereby ensuring the need for large and 'sustained' research programs.

One might therefore argue that expected changes in industry, government, and other organizations will improve the likelihood of sustainability. However, this may be expecting more than the vestigial education systems could support, and more than a public challenged to choose between environmental care and a rising economic standard of living could quickly accept. The moral leadership once potentially existent in the simpler model of corporate-owner responsibility and philanthropy seems to have dissipated with the separation of corporate control from ownership in the form of wide shareholding in society.[164] While ordinary persons may desire a corporate sector that is socially responsible to the point of reducing financial returns, as shareholders they apparently seek to maximum them. It does seem that the present economic rationalist road, down which we are 'going so fast', does not lead to sustainability, even though it leads to more sustainability research. There is a contradiction

[164] R. Monks (2001)

between the ends and means of growth/profit and those of sustainability that requires delaying or reducing benefits, which may only be resolved by exceeding the limits of growth-profit and painfully adjusting, or by forestalling that day by ever more clever science. Such placing of ends above means, seems to me to conflict with all durable morality, and conjures up the ghost of Keynes[165] sacrificing virtues to avarice and usury in the name of economic growth.

It is futile to hope that the whole research industry should 'try to stop' in order to conceive the depth of sustainability That would at the least jeopardise ongoing funding and programs, and may undermine the progressive ethic of technological solutions to economic, environmental, and even social problems. In fact, as senior high school students have told us that their three major concerns are; war and nuclear threats, environmental protection, and a fairer and more humane society,[166] there may be no need to stop – youth may simply overtake current approaches and elevate sustainability to a moral end in its own right from its current sacrificial role to profit and growth. Being pink before the age of 30 now has real political significance with an influential voting youth!

For those concerned with agriculture, industrial approaches pose an often conspicuous challenge to the natural environment in such forms as; constant tillage, overuse of chemicals, escape of genetic material, and salinity induced by irrigation and land clearing. As in other business, current approaches to sustainable agriculture aim to modify practices within the current structure – an approach that maintains the myth of stability through

[165] E. F. Schumacher (1973)
[166] D. Dunphy (2001)

'sustained' research activity. Less travelled and slower roads do exist, but their destinations are frightening if we seek to maintain most of our rising economic demands.

Backyard Agriculture

One example, that produced a change in my own perspective, was contained in a letter received in response to an ABC Radio program a few years ago[167] concerning future global food needs. The letter simply asked, 'could we produce enough for ourselves from our own backyards?' Naïve and impractical! – this was my initial response. But over time, the psychological, social, nutritional, and other benefits of home production of food, even where a cheaper mass-production agribusiness operated close-by, caused me to compare the suggestion to the situation of peasant farmers in Thailand. These small Thai farmers form part of, or exist side-by-side with, exporting agribusinesses, and where they can enjoy adequate education and health services, appear very well adjusted to the world and each other. To dismiss such suggestions as backyard food production as 'third-world', 'a backward step' or as I did, 'impractical', may be to ignore the reality of the changing world, or indeed an ancient reality. The small peasant farmer example also served to highlight that environmentally sensitive practices are more likely to be applied in small–scale than large-scale agriculture. The art of the chef is more evident in the specialty dish than in the mess hall cauldron.

Environmental responsibility also blossoms where problems appear intractable to the 'sustained' production research

[167] L. Falvey. (1997)

approach. For example, the important Murray-Darling basin research program considers technical, environmental, social, and economic factors in partnership with current residents of the wide region, so that all may understand the ongoing monitoring of the complex and dynamic environment. Results shared in this approach already indicate that there is 'no predictability'.[168] Such a conclusion about the natural world accords with those of wise investigators of the natural world over the past 2,500 years, as discussed in Chapter 9.

What was the Question?

How does all this relate to the title question – 'Sustainability is the Answer – What was the Question?' It is clear that much of our emphasis on sustainability, particularly in agriculture, aims to sustain profitability reliant on the use or consumption of natural resources, rather than, for example, to maintain their integrity regardless of perceived utility. Furthermore, if forced to confront this issue, we trot out the *non sequitur* that if profit is sustainable, then the underlying resources must have been sustained; the argument usually assumes, among other things, that fossil fuels and other inputs arrive at no environmental cost, that conversion of third world subsistence farms into commercial ventures improves quality of life, and that off-farm impacts are environmentally neutral.

From this perspective, it might seem that sustainability is the answer to the question, 'how can we maximize profitability while minimising impact on the environment?' I find this a practical and socially responsible question in some

[168] S. Morton (2001)

circumstances. However, this is not the question that society and apparently, the influential youth of today, are asking. As already indicated, their question might be more like, 'how can we produce food without harming the environment?' The answer to such a question allows consideration of sustainability separate from profitability. It does not, as some economists might claim, necessarily infer that quasi-market prices should be ascribed to the environment and monetised incentives be employed to effect slow changes in behaviour. It does imply an openness to different social and economic arrangements – such as small farms in place of most large corporate farms.

The analogy that appeals to me is the use of increased safety procedures as an answer to demands for cessation of nuclear proliferation. Such an approach alienates and breeds distrust in the concerned public. Given the rising city voter influence in rural affairs, alienation and distrust should be anathema to responsible agriculturists and their political colleagues.

Possible Answers

Three of many possible answers to the question, 'how can we produce food without harming the environment?' follow. One is to use low-impact or, if any are known, zero-impact technologies in research comparisons. In field agricultural research, these technologies would be used as best-case control treatment in experiments. Analyses of results would consider social and environmental costs and benefits. The essential reductionist approach to technical research encourages reporting on that basis, but may rather be a useful input to socio-economic comparisons. Many will claim this currently takes place, but perusal of research papers quickly indicates technical outputs

claiming possible financial benefits without consideration of social or environmental effects. As research is increasingly funded from the corporate sector, this may seem an honest response that is the most helpful to the funder, but it is not sustainable agriculture. And reliance on the compensatory field of secular ethics is a poor substitute for long lost philosophers who not only espoused their moral philosophy, but lived it.

A second possible answer is to recognise, value, and foster small-scale agriculture conducted by individuals and families; in a manner other than commercial production subsidies. Our routine distinction into corporate and family farms is confounded by various motivations in family farm incorporation, and those individuals taking a short-term business approach akin to the common image of corporate behaviour. The essence of small-scale agriculture is the opportunity it affords for contact between the producer and nature, and the respect that this can engender – physical output is secondary. Environmental benefits occur through the producer's actions operating within the natural flow, social benefits occur through physical and psychological health, and potentially through wider gainful yet non-monetary employment. Small-scale includes the smallest rural holdings and, yes, even backyards.

The third possible answer requires a global perspective. The current unsettled world situation provides a convenient shorthand for this point, extending even to moral responses to offering refuge. In Australia's case, geographical proximity alone indicates the futility of a future separate from Asia, and this is now emphasised by Australia's continuing relative decline in secondary and tertiary industry compared to other OECD

countries and apparent acquiescence to continued under-funding of all education levels.

Rising Asian investment in Australia reflects a trend that is barely interrupted by world events. The question from China – 'what have you Australians done to deserve all that open space?' may be flippant at this time, yet is salutary as we consider other forms of agriculture, and more sustainable forms at that – China has open spaces also, but it uses its backyards in the densely populated areas. The One Straw Revolution of the Japanese scientist, Fukuoka,[169] is based on an ideal community which has a high proportion of its people are engaged in producing at least some of their own food. It is easy to dismiss such 'muck and mystery merchants' as I recall these termed in my undergraduate years, as naïve and impractical, but perhaps we are 'going too fast' to see it for what it really is – something far more than a food production system, and certainly far more than a trade.

Sustained Responsibility

Global responsibility may well be forced on us eventually, with population and environmental changes that will transcend even current fears of change. Acting in a more sustainable manner is one aspect of responsibility, but its obvious interaction with global population indicates that the real question to which sustainability is the answer may well be the one that has yet to be heard - 'how can we produce food without harming the environment?' It is more difficult to answer than the self-serving question 'how can we maintain profitability while minimising

[169] M. Fukuoka (1978)

impact on the environment?' And if we agriculturists patriotically support an introspective calculation of a low human stocking rate to 'sustain' the nation's comfort, we will probably again stumble over our rhetoric that food aid and food exports are supporting food-deficit countries. The facts are the opposite – world food aid fell from some 15 million tonnes in 1993 to eight million tonnes in 1997[170] (millions not billions), and .global agricultural trade represents only about ten percent of total production[171].

Francis Bacon, one of those who unwittingly set science speeding down its path, observed that 'ultimately, all experiments work upon the matter and spirit of the created world, including the minds and passions of human beings.'[172] Agricultural research is working on the 'spirit of the created world' but physical outcomes, even in sustainability research, have subdued that spirit. Perhaps this is why sustainability appears elusive when it is in fact illusory in that clouded mental state in which we conduct ourselves.

Other deeper reasons for reconsideration of conceptions of sustainable agriculture are elicited in Chapter 9. However, the wider implications hinted at by informed youth and an apparently rising number of others provide encouragement for a re-humanizing of agriculture, and surely that could be a step toward the natural unity within which the only true sustainable agriculture might exist – and this may be glimpsed in the disappearing cultures of poor countries as discussed in the next chapter, Chapter 8.

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[170] IFPRI (1995)
[171] A. McCalla and L. Brown (1999)
[172] J.C. Briggs (1999) Page 3.

Chapter 8

The Spirit of Agriculture: Applied Agricultural Ethics in Thailand

spurning spirit, we pain pursue,
though seldom see the reason

Ironically, global forces, now touting sustainability in their programs, assume local guises that often displace existing agricultural systems that themselves seem to have been environmentally stable over millennia. Using the case of Thailand, we may consider such matters as how environmental thought has been influenced by Western ideas, and how local environmental arguments against intensive agriculture have sought a value base in Thai Buddhism and modern perceptions of traditional values of environmental respect. This can be read as either an emerging Thai environmentalism in the face of undesirable foreign influence, or as the balancing forces of Western environmental and materialistic thought pervading an Asian culture. In Thailand, a small resurgence of self-sufficiency in individual agricultural production has become a link between popular Buddhist exposition and dissatisfaction with economic development models, thereby linking tradition with modern trends. The spirit of agriculture as part of the natural environment struggles for acknowledgement in the face of materialistic forces yet remains evident in the everyday lives of poor Thai farmers; and somehow this seems to influence part of the educated urban middle-class to protect cultural values. The modified natural environment of Thailand that proved to be a sustainable agricultural system over a

millennium was supported by a moral code informed by insights that embraced nature. So it seems that knowledge beyond rational thought must be part of our effort to produce food and other natural products in a sustainable manner.

In our narrow technological search for sustainability, we tend to neglect the fact that the closest agricultural systems have come to being sustainable is in low technology environments of the past, which today may be more readily found in LDCs – this tells us that sustainability is not necessarily illusory. Of course, population has increased and those systems may not be appropriate to today's conditions – but then, they might just be! We need to scrape below the surface of our never-stated-assumption that agricultural technology developed and applied in the West must be superior to peasant systems of LDCs and also be part of the 'sustainable solution'. To do this, I consider a case with which I am familiar – agriculture and its related environmental considerations in Thailand, drawing on research for the book 'Thai Agriculture.[179]

Thai environmental thought has been strongly influenced by Western ideas.[180] Local environmental arguments against intensive agriculture have sought a value base in Thai Buddhism and modern perceptions of traditional Tai (the ethnic group that migrated south to what is now Thailand and to other locations and which formed one part of the ethnic make-up of modern Thailand) values of environmental respect. Is this an emerging Thai environmentalism as a reaction against undesirable foreign influence, or is it the balancing forces of environmental and

[179] L. Falvey (2000a)
[180] J. Rigg (1995)

materialistic views active in the West transplanted to an Asian culture? I posit an answer to this question in this chapter, although the answer itself turns out to be less important than the experience that can be gained from consideration of past attitudes to the natural and agricultural environments in a major agricultural area such as Thailand. Recent resurgence of self-sufficiency in individual agricultural pursuits has become a link between popular Buddhist exposition and dissatisfaction with economic development models, in a way echoing the premise of Tucker and Williams that religions may be instrumental in addressing environmental crises.[181] Is this a reasonable linkage to make, and is it an honest interpretation of Buddhist and cultural values?

As Anderson[182] has observed, religious symbols have been used by most traditional societies to conserve valued aspects of landscapes, although it seems that the expansionist agricultural societies valued changed landscapes perhaps as much as natural ones. Buddhist love of nature is likened to respect and friendship with a fellow-being seeking spiritual growth as if the two are one, which in other words might be considered the external environment. Species eradication, economic development, individual acquisitiveness, technological control, and anthropocentricism ascribed to Western values are easily contrasted with Buddhist views of; humans as part of nature, non-violence, mental awareness, conscious action, and ego extinction.

Claiming a long tradition of environmental awareness amongst forest monks devoted to hermitic personal meditation as distinct

[181] M. Tucker and D. Williams (1997)
[182] E. Anderson (1996)

from urban-based monks reliant on text learning provides a convenient metaphor for rural and urban values; yet the essence of forest monkhood has been separation from worldly society. Some might therefore see the proposed environmental education roles for forest monasteries such as Suan Mokkhaphalaram[183] as a modern protest rather than as revival of a tradition. Likewise, promoting temples as havens for endangered animals,[184] and highlighting apocryphal Buddhist stories concerning the cutting of trees, appears to suit modern environmental messages yet may be ex-contextual or simplistic interpretations.

For those who decry such manipulation of Buddhism in Thailand as an instrument of national integration, the unification of various aspects of Theravada Buddhism to form a national religious system in the early 1900s might be seen as the first error. However, this helped to create the nation of Thailand, and for this reason appears consistent with religious support for moral national objectives, including balanced economic development and equity for tribal peoples. Nevertheless, alignment with national policy may have reduced the religion's subsequent influence in Thai society.[185] Recent popular thought in Thailand has caused its emergence as a leader in modern Buddhist environmental thought, notwithstanding the difficulties inherent in claiming canonical authority for new religious ideas.

Conservative Canons

[183] Visalo, Phaisan (1990)
[184] Kabilsingh, Chatsumarn (1987)
[185] C. Keyes (1977)

Interpretation of the Pali canon has recently ascribed to Buddhism such attributes as, environmental awareness, social responsibility, and sustainable agriculture. Such claims may be examined by questioning whether Buddhism advocates an environmental ethic, is ambivalent to the environment, or in fact contributes to environmental degradation.

Buddhist environmental ethics appear easily confused by adoption of anthropocentric interpretations. If Buddhism advocates individual release from ego, and other teachings are interpreted as means to assist this end, including a correct world-view attained through contemplation, then original Buddhism can be interpreted as affirming the world rather than escaping it;[186] however, others consider that in focusing on humans, it values human above other creatures and plants.[187]

As the environmental issues discussed today were not conceived when Buddhist texts were written, explicit Pali statements on current issues cannot be expected. However, to remain a vital social force, the religion probably needs to address current issues through modern exegesis of traditional teachings that consider care for nature as a spontaneous outcome of an individual's spiritual development, but not as a valued activity in its own right. The state of the environment might therefore be interpreted as a karmic outcome of the actions of individuals and groups.[188]

The most common invocation of Buddhist teaching as environmentally enlightened is the prohibition of killing sentient

[186] J. Macy (1990)
[187] N. Hakamaya (1990)
[188] L. Schmithausen (1999)

beings. To argue these as environmental ethics within original teachings requires uncommon objectivity, especially if precepts are seen as preparatory moral steps toward personal development of wisdom. In terms of evaluation of existence, Buddhist texts seem to be ambivalent, seeking only to liberate from suffering. Likewise, the central insight of causal dependence can hardly be claimed as a specific prescient statement of ecological interdependence.

Removal of suffering by eliminating craving, including greed for material possessions, social prestige, and perhaps even sexual gratification when linked to irresponsible population growth, may reduce environmental destruction. Teachings on loving-kindness and consequent unification with other living beings similarly impart incidental environmental benefit, although minimizing pain to individual animals relates poorly to biodiversity concerns. Thus early Buddhist teachings may incidentally promote environmental care. But these are ethical principles that aim to work in concert with mental awareness to produce insight, one product of which is ethical and loving behaviour.

Objective consideration must also include teachings which conflict with current environmental values, such as killing animals foreign to an environment in order to return it to a modern perception of its original form. Individual Buddhist teachings that advocate reduced injury to plants because they house insects, or pollution of water because it contains small animals, can be used to both support and criticize sustainable agriculture approaches within an ecosystem. Such worldly impractical teachings have led to lay propitiation for essential agricultural actions, such as offsetting the killing of small animals

and insects by meritorious deeds, and to the allocation of killing for meat to other persons in the Thai society.[189]

Another strand of Buddhist writings with environmental references relates to remote forest monks whose spiritual search was intensified by such attendant dangers as wild animals. Thai forest monks support environmental protection today, although the original association recalls times when forests were abundant, and it was probably inconceivable that they would one day be threatened. Purists note that the tradition is derived from Hindu practices, as may be the anthropocentric adaptation of environments to suit mankind that pervade Thai environmental history. Modern views of animal species preservation are unsupported by Buddhist texts which present animals as a lower life form than man with concomitant greater levels of suffering as a means of teaching the central message of human liberation from suffering. The more popular Jataka texts anthropomorphize animals and allow some to be considered more worthy than others. To illustrate the confusion that arises from searches for literal interpretations of scriptures on such peripheral matters as species conservation, compare ethical precepts that advise avoidance of killing, which appear to favor conservation, with acceptance of human population growth as a positive development, but which today causes the demise of wild animals.[190]

Early Buddhist sources present an ideal world as populated by villages and wealthy cities that are wary of nature, reminiscent of the Western fear of nature. However, the Discourse on True Blessing, *Mangalasutta,* also assumes that individual morality is

[189] L. Spiro (1982)
[190] L. Schmithausen (1999)

essential to an ideal society that would exhibit a constructive and harmonious environment in visual and auditory terms, and ensure excellent education, income, and public services for all members who would retain an excellent ideology;[191] the parallels with modern pushes for good governance are clear, with incidental environmental benefits. Many ideas were absorbed into Buddhism from Indian civilizations of the time and the same era of Indian spiritual development also influenced Western thought. As discussed below, the wheel has now turned with the West influencing modern Buddhist environmental thought.

These eclectic examples of Buddhist views of nature confirm that it is not concerned with domination in any form, but with transcendence of all such views through detachment. Such negation of nature includes negation of civilization; nature is thus not treated separately in the essential teachings. So, while Buddhism did not acknowledge ecology in the modern manner, many of its values enhance environmental care, particularly compassion. Modern Thai Buddhism contrasts with some early teachings simply because the issues of today were not foreseen and hence not used as examples to explain desirable moral codes for lay persons. Seen in this light, there may be no reason to seek further textual derivations for modern eco-Buddhism.

Thai Eco-Buddhism

If the link between Buddhism and environmental consciousness is thought to lie in modern thought, then the origins of eco-Buddhism deserve consideration. To do this, stumbling-blocks such as the doctrine of causation are conveniently ignored as a

[191] Chandra-ngarm, Saeng (1998)

separation between insight and routine religious practice, as occurs in all religions; even though that very stumbling block is the cornerstone of Buddhism. In any case, consideration of the arguments is instructive. In Thailand's case, the close relationship of State and religion in Thailand appears to facilitate development of an intellectual eco-Buddhism.

Harris'[192] lists five intellectual groupings of eco-Buddhist thought;

- authoritative endorsement without canonical reference,
- endorsements referenced to Buddhist doctrine,
- actions by high profile monks, nuns, and lay persons,
- doctrinally concerned yet sympathetically supportive, and
- objection on the grounds of canonical inconsistency

By themselves these imply rising support for eco-Buddhism. It is easy to conclude that in accepting change, Buddhism denies the universal purposive intent of other religions and hence is silent on the maintenance of an environment[193] suited to humans and ascribable to God. Leaning more to a pragmatic 'scientific' world-view than a purposive teleological view of the world in Stace's definition,[194] eco-Buddhism draws on a Western philosophical and intellectual base, as part of rising global eco-religiosity, building on liberal Christian philosophy from the 1960s.[195] Such views seem anathema to popular Thai eco-Buddhists.

[192] I. Harris (1995)
[193] I. Harris (1991)
[194] W. Stace (1952)
[195] I. Harris (1995)

Inter-religion dialogue over the past three decades found a common and unthreatening theme in the environment.[196] The interconnectedness of mankind is reflected in global environmental issues, discussion of which facilitated intellectual congruence in meetings removed from cultural and historical sensitivities of each major world religion.[197] Both Buddhist and Christian advocates readily incorporate holistic views of the universe, political and social global equity, resource stewardship, and supposed superior values of the past.

Eco-justice views have been evident in Thailand among social activists who link sustainability of society to Buddhist principles. Post-1997 economic crisis emotions have allowed these views to be widely canvassed as an antidote to excessive consumption, and to advocate attenuated industrial development as part of moderation and personal responsibility. Activists have been able to invoke authority through, for example, respected monks ordaining threatened trees.

At the heart of eco-Buddhism approaches is the stumbling block of the intellectual tool of separating subject and object in relativistic comparisons. This very facility that allows human discourse and material development impedes spiritual development according to the insightful of all great religions.[198] Worldly approaches seeking to accommodate such unintelligible truths in, for example, practical agriculture will therefore inevitably produce conflict; nevertheless, recognition of different approaches for commercial and self-sufficient agriculture is

[196] P. Beyer (1994)
[197] I. Harris (1995)
[198] D. Suzuki (1962)

producing outcomes that may yet attach some unique qualities to future Thai agriculture.

Eco-Buddhism and liberal Christian eco-justice advocates are linked through some NGO development philosophies – an association that lends credibility to these new religious views. However, extreme measures to motivate environmental action, such as warnings of an apocalyptic environmental catastrophe, are more easily accommodated in Western than Buddhist thought. Ironically, Thai activists may have accepted a largely Western philosophy to counter the perceived unsuitability of Western economic approaches of recent decades. Such considerations presumably support conclusions that development activities are self-perpetuating and a threat to the poor.[199] In any case, pragmatic Thai Buddhism may well embrace such global environmental views because their outcomes appear beneficial, and the cost of acquiescence low. In so doing, Thailand would be part of wider revisions of practical approaches that acknowledge such international associations as poverty, population, global food needs, and globalisation of both economic development and, for example, religion.

Global Associations

Today's evident link between rural poverty and environmental decline in LDCs is readily contrasted with supposed past values of environmental care. For such successful agricultural groups as those which came to be known as Thai, attitudes to nature may share some less benign approaches of environmental exploitation with other historic manipulators of the natural environment. This

[199] P. Hershock (1999)

broad subject is approached in a hierarchical and integrated manner, from the perception of applied agricultural ethics.

Thai agriculture has significantly changed the natural environment as one part of global food production. As a major agricultural exporter, further modification of the natural environment is likely, even with improved resource regulations and environmental research and education. Romantic views of environmentally sensitive traditional forms of agriculture ultimately have acknowledged the realities of a higher global population density - and reliance on export income has irreversibly made Thailand part of this global culture.

Globally, popular quasi-religious replacement of scientists for lost superstitions[200] produces such fallacious beliefs as knowledge being sufficient to produce future global food requirements from chemical-free farming. Sustainable food and fibre production has long required new technologies and ideas and these now rely increasingly on an environmentally educated populace to arrive at informed views. However, in Thailand, polarized opinions can raise environmental issues without prior analysis. Similarly, enthusiastic embracing of popular eco-Buddhism can assume that Thailand suffers from worse environmental management than its neighbors and Western countries when this is not the full case, though attitudes and education have long been subject to foreign influence.

Thai Attitudes and Education

[200] W. Stace (1952)

Foreign contact and goods from the early export markets of Ayutthaya marked the beginning of a shift from traditional Tai cultural values. Institutional innovations included creation of the predecessor of the Ministry of Agriculture and Cooperatives to oversee issues affecting Crown revenue from agriculture. By the early Bangkok period, the *Krom Na* formed one of seven key ministries that separated worldly-wise aristocrats from peasants, who thus became *de facto* repositories of traditional environmental and other values.

Values of peasant self-sufficiency are commonly said to have begun to shift toward commercial production under King Chulalongkorn's modernization, although adherence to traditions by semi-subsistence small-holders remained significant through to the 1970s. Traditions also subtly shifted through the social mobility offered by monkhood education that linked aristocrats and peasants while supporting social stability[201] and conveying basic Buddhist values of right livelihood and reverence for life. Adoption of Western schooling from about 1900[202] initially included a religious ethic but was soon oriented to the foreign skills that proved more personally rewarding in the expanding and prestigious civil service. Thus environmental traditions in education from pre-Buddhist times were blended with Buddhist values that in turn were subjugated to Western influences at central level.

Increased demand for practical skills produced vocational training as an antecedent to modern education, with token links to religious values. Agricultural education, emerging with the 1900s modernization, expanded rapidly in the 1940s and adopted

[201] D. Wyatt (1966)
[202] D. Wyatt (1975)

a production orientation that has – as is the case globally – strayed from its philosophical and moral foundations.[203] Education in Thailand can thus be seen as both an indicator, and a product, of shifts in cultural attitudes. The influence of Western education and associated economic forces of recent decades has forced Thailand to conform with global developments, which have a differing underlying approach to environmental management.

Anti-Buddhist Global Economic Models

As introduced in more detail in the preceding chapters, global economic development has been assumed in policies of international development agencies with environmental matters added after experience with more narrowly based programs. Global commercial networks have suited Thailand's modernization objectives, allowing dominant trans-national and national agro-food complexes[204] to determine commercial production systems in concert with structural adjustment policies of the 1980s. However, mobility of capital renders reliance on this system risky; for example, contract growing can link small-holders to global price variations while exposing them to risks of transnational company's relocating to another cheaper-labour country. In addition, a global tendency towards over-production reduces prices and thus hampers attainment of national objectives while completing a scenario that appears to oppose espoused Buddhist values.

The majority of Thai farmers are small-holders who have long been lobbied through extension promises; a current one is

[203] L. Falvey (1996)
[204] A. Bonanno (1991)

sustainability. New ideologies, justifications for unsustainable practices such as shrimp aquaculture, and renewal of Thai Buddhist principles, have all used this new catch cry.[205] The concept, which originated from good intent[206] to balance Keynesian economics with social welfare, continues to assume that the Western capitalist model is reproducible.[207] As small-holders have become a distant and uninformed component of a global trading system, their traditional environmental practices have been replaced by so-called Western attitudes of nature domination, itself a by-product of political development in all post-agrarian societies.[208] Emergence from feudal societies allowed individuals to become intellectual and economic entities that incidentally allowed a separation of socio-cultural matters from the natural environment.[209]

Free market approaches that have separated economic from environmental interests[210] have, among other things, stimulated neo-Marxist emphases on ecological responsibility. Social and environmental costs have caused development specialists to reconsider the simple Western model through often impractical social and individual choice models, producing intuitive linkages between development and local requirements.[211]

The 1997 Asian crisis highlighted forgotten assumptions of adequate governance, and thereby forced all to realize that the social-economic factors long earlier defined as essential to

[205] Payutto, Prayuth (1995)
[206] WCED (1987)
[207] P. McMichael (1996)
[208] A. Kuper and J. Kuper (1995)
[209] A. Naess (1989)
[210] J. Dryzek (1987)
[211] J. Streeten (1995)

functional development by Adam Smith were not universally present. Sustainable development, if the term has any meaning, might therefore be conceived as a recollection of past insights into human behavior and experience in international development. From such realizations, environmental values were added to economic models[212] in the same manner that social needs had been in an preceding decade. The past 50 years of international development has indicated that stability is essential to achieve economic growth that does not, in any case, filter down to poorer segments of society who require specific human needs programs. A comprehensive group of integrated policies is now seen as essential to stimulate development that must be supported by socially inclusive and responsive institutions.[213] This critical view of international development still omits the effects of over-consumption and the alienation of millions from technologies such as new communication media and patented genetic material, both of which highlight the continuing dilemma of the economic development path.

No Middle Path

Importing of development planning to Thailand without the cultural associations that created the economic paradigm allowed unrealistic expectation of theoretical outcomes. Technically oriented development practice with its deliberately narrow methodology of economics to interpret past interactions was trusted for forecasts. Valuing of human factors and natural resources at zero led to assumptions that all income was of the same value regardless of whether it was derived by human effort or speculative activities.

[212] H. Daly and. J. Cobb (1994)
[213] World Bank (1999)

As noted already, economic analysis allows such items as sustainably produced food, mined natural resources, or labor in primary, manufacturing, and services sectors to be valued on the any agreed basis. Emotive views that economists know the cost of everything and the value of nothing are belied by natural resource and welfare economics, which could estimate the efficient price for a resource as the marginal cost of; supplying a resource to a user, plus any lost ecological functions, co-lateral pollution, lost future options, and lost existence and bequest value. But this is still only a partial recognition of values ascribed to life-style, culture, and other costs of development – though it does offer scope for application of a form of Buddhist economics.

Approaches to science imported to Thailand have similarly been misinterpreted into a belief system that delivers eternal consumer improvement. Its treatment in isolation from the humanities separated it from parallel Western moral precepts once maintained through religion, such that life is characterized in terms of scientific solutions to mental and physical health, and environmental problems. This precarious interpretation applies to all materialistic societies that assume continuous technological development and the honesty of the market place; for Thailand, it means that sustainable development cannot be expected from simple adoption of a foreign model. Nevertheless, Thailand was shepherded into the industrialization model from this position of unbalanced views of economics and science.

Competing with other low-middle income countries to join industrialized countries that consume a disproportionate amount of global non-renewable primary resources is anathema to

Buddhist economics. Forty years of experience since the Marshall Plan in Europe had showed that rapid resurgence in Germany and Japan was possible because essential foundations existed. These included broadly-based education, relatively equitable and working political and legal systems, and values which linked development to social stability. Thailand's adoption of the accoutrements of industrialization without such essential elements limited its development to being an adjunct of industrialized countries and requiring foreign management personnel, while relying on cheap labor, and becoming a price taker to larger industrial groups. Of course, our present view may simply be of the first faltering steps of such infant democratic capitalist nations.

Balanced development in Thailand would have included broadly based and effective education, social welfare policies, and the rule of law; it also implies the adoption of a materialistic ethic in place of traditional values. If Buddhist ethics suggest that means are more important than ends, output oriented policies seem anti-cultural; valued and valuable work opportunities might thus be worth more than production of weapons, for example.

In the case of Thailand, world-leading economic growth obscured concern over the loss of traditional values, unsustainable environmental exploitation, and corruption that exceeded generous cultural levels of tolerance. While it may be argued that the ensuing economic crisis might well have been worse in the absence of Buddhist values, its severity stimulated a reconsideration of views propounded by philosophically informed persons who had sought to redirect Thai society to its traditions, and to link these to Buddhist environmental values. A curious development that evokes emotion and argument around

its inconsistencies, it holds practical opportunities for Thai agriculture, small-holders, and the environment. The first, although not critical step, has been to invoke Thai environmental traditions.

T(h)ai Environmental Traditions?

The usually irresistible forces of economic development waned slightly from 1997 allowing some balanced views to be aired among wild recriminations about financial management. These views had been formulated against the success of the wealth creation model and were sufficiently formed to allow significant Thai contributions to a rising Buddhist environmental ethic.

We have seen that traditional Thai environmental management pragmatically modified the environment to suit rice production and co-existed with other more benign systems such as shifting cultivation. This approach to living in harmony with nature[214] appears to have been a Thai ethic from this anthropocentric perspective, as suggested in Ramkamhaeng's praise of the natural landscape of his kingdom of Sukhothai being 'as beautiful as if arranged by man',[215] the Sibsongbanna Tai ideal of holy hills and village forests,[216] and ancient Thai literature eulogizing nature's bounty.[217] Likewise, such nature worship might be claimed of Buddhistic ceremonies related to such environmental ceremonies such as *Naak Hai Nam, Phra Mae Thoranee, Phra Mae Khongkha, Pharajaphithi Lai Ruea, Pharajaphithi*

[214] Kriengkraipetch, Suvanna. (1989)
[215] Khanittanan, Wilaiwan. (1989)
[216] Sheng-Ji, Pei (1985)
[217] Rutnin, Chamnongsri (1989)

Lai Nam, *Pharajaphiti Phirunsat, Bang Fai*, *Songkran*, and *Pharya Mae Phosob.*

As the central component of Thai tradition, rice has assumed a spirit that prevents famine, a concept implied in the sophisticated old Mon language of rice culture and associated philosophical concepts derived from the later introduced Buddhism. Respect for rice, formalized through everyday rituals akin to saying of grace in Western cultures, acknowledged *Mae Phosop*, the Rice Mother in the raising of one's right hand while taking the first mouthful of rice, and by a *wai* at the end of the meal. Appropriate reverence throughout planting, harvesting, threshing, pounding, polishing, transporting, and storing of rice ensured good harvests. Animistic references to rice being 'pregnant', similarly reflect an assumption of the vital spirit of rice;[218] likewise, more virtues were once nominally ascribed to *Mae Phosop* than to the Buddha by northern Thai persons.

As noted earlier in this book, the shift from traditional to institutionalized irrigation systems brought a reduction in the perceived influence of spirits on the control of natural events, leading to a reduction in ceremonies to the Great Mountain Lord *Jao Khao Luang*, Lord of One Hundred Thousand Elephants *Jao Saen Chang*, Lord of the Golden House *Jao Ho Kham*, Lord of the Iron Wrist *Jao Kho Mu Lek*, and ceremonies on specific days of the waxing moon of selected months. Irrigation managers who had organized these ceremonies accordingly lost their power as the *kamnan*, an institutionally approved locally elected leader, assumed authority. Villagers perceived increased frequency of flooding, siltation of irrigation systems, and variations in rainfall

[218] Rajadhon, Anuman (1955).

regimes and attributed these to a progressive reduction in the power of the spirits as the Royal Irrigation Department assumed authority.[219] Interestingly, some ceremonies have been absorbed into modern Thai institutions.

As the spirits lost power to officials, once acceptable practices, such as lower social status conferring lower levels of duty, led to reductions in maintenance of irrigation canals, protection of public forests, and even tidiness of communal areas. Moral and religious silence on environmental matters falsely assumed continued sensible behavior; merit-making rituals performed for traditional reasons remained unconnected to environmental matters.[220] By the 1970s, diversification away from rice became policy, officially severing the remaining link between animistic-Thai Buddhist belief, and economic and environmental well-being.

Upland export crops introduced from the 1960s had few traditional associations, and the overriding influence of cash incomes favored acceptance of the view of continued economic growth supported by faith that science could solve all problems, including environmental problems. From this perspective, modern Thai environmental thought may be seen as derived from the West rather than a direct outcome of tradition. Coincidentally, attempts to find a Thai eco-Buddhism in popular interpretations of ancient teachings, may unwittingly be also drawing on Western thought, as indicated in current practical approaches to the Buddhism-agriculture interface.

Practical Approaches

[219] R. Lando (1983)
[220] J. Mulder (1968)

In environmental terms, treating nature as separate from humans is said to neglect individual spiritual development to the detriment of both individuals and society. From this integrated perspective, economics, environmental concern, and human existence are inseparable, and consequently economic activity must ensure that it does not harm society at the individuals' level. Practical outcomes of such thoughts include the eight components of the Buddhist Path that aim to develop the individual's wisdom, and to also support teachings that all persons should engage in honorable, fulfilling, and creative activities. It also implies that government economic success should be measured as an absence of poverty rather than high national income.[221] This practical view shows the illusory character of economic growth based on environmental destruction, rising rural poverty and unemployment.[222]

Buddhist principles, long interpreted flexibly, have inhibited rather than prohibited meat consumption, although the bulk of Thai dietary energy and protein has been derived from rice and fish until recently. Moral and religious pragmatism in Thai subsistence agriculture continues in rural communities with some cultural memory of migration, for example the Tai Yong in the North consciously observe the need for recreation and reproduction as well as transitory aspects of being and non-violence in the composition and presentation of their meals.[223] Symbolically, the matri-focal Thai culture intertwined with religious values in self-sufficient agriculture is recalled through

[221] Payutto, Prayuth (1994)
[222] D. Swearer (1997)
[223] I. Trankell (1995)

the embracing word *khropkhrua* (family) incorporating the word *khrua* (kitchen) in the manner of the English 'home-and-hearth'.

Practical interpretations of Buddhism also derive curiously from dissatisfaction with divergence of institutionalized Thai, Sri Lankan, and Indian forms from original teachings, and this has led to new sects within Buddhism. Environmental concern is one unifying factor in these sects, which in Thailand have also highlighted behavioral excesses of some monks, politicians, and businessmen.

One Buddhist conception of economic systems views work as a means to employ and develop inherent faculties and to reduce ego-dominance by cooperating in common tasks while providing essential components for life. The expected outcomes of human dignity, freedom, and spiritual well-being contrast with the economic planning which values outputs above intangible human welfare benefits such as creative activity. This approach may, for example, rank full self-fulfilling employment as a higher objective than increased national wealth, ascribe a high value to the natural environment, and require industries to compensate for environmental incursions.

Application of the approach to Thai agriculture leads to equally radical outcomes. As per the example of an earlier chapter, the working animal of a small-holder has a broader inherent value than a tractor, so why would mere work output determine the relative values of tractors and buffalo? Buddhism values agriculture and its working with soil, being involved with countless living organisms in the soil, plants and animals, and the interaction of humans as part of the biological process; but it can also value the repetitive, machine-reliant industry with its

dependence on supervision, management, sick leave, and holidays, if it is not demeaning and reliant on a diversionary-based lifestyle outside the factory, for example. It is incorrect of Buddhists to portray the teachings as primitive.

Practical religious thought, including new economic perspectives, have attracted attention within and outside Thailand. One bridge between apparently conflicting human and environmental views has been consideration of alternative agricultural production systems. A practical interpretation of such alternatives as a middle path for poor small-holders in Thailand has been promoted and trialed with varying success.

Buddhist Agriculture?

Concern that intensive agriculture neglects beneficial components from traditional farming systems is likely to lead to absorption of alternative agriculture in Thailand with a Buddhist appellation, within institutional definitions of sustainable agriculture. Technologies to increase food production and divert famine may have reached a peak within current constraints which include environmental consciousness.[224] This suggests that potential exists for traditional or alternative agricultural practices to complement Green Revolution technologies in the next step of agricultural research and development in less developed countries. Agro-ecological approaches attempt this by reducing costs for socially and environmentally informed technologies without assuming any reduction in yields.

[224] P. Pingali, M. Hossein. and R. Gerpacio (1995)

Alternatives to intensive commercial agriculture may be profitably considered in terms of their origin, application, and success in either more-developed, or less-developed, countries. Self-sufficiency implies quite different qualities of life in different countries in terms of health services, access to education, opportunities for one's children, and communication. As a lower middle-income country unlikely to achieve rapid industrialization of a sustainable or highly profitable type in the next decade, Thailand's tentative moves to greater social equity in the late 1990s indicated some application of the Buddhist values introduced above.

As introduced earlier, alternative agriculture is associated with low input and ecologically considerate forms of food production that incorporate essential human values including self-reliance, healthy food, and some income.[225] One approach tried in Thailand was the Japanese Fukuoaka farming system which eschews plowing, weeding, commercial fertilizers, pesticides, and pruning, while emphasizing the spiritual aspects of the practice of farming and producing sufficient food for the family, possibly with a small surplus for security or sale. Developed in a temperate climate, its application to Thailand suffered from rapid tropical weed growth. A modification, the Kyusei Nature Farming system, aimed to produce high quality food while meeting economic and spiritual objectives for both farmers and consumers[226] through use of microbial inoculants to improve soil quality and plant growth. Relying on a well-developed delivery infrastructure for inoculants, and some doubt of the efficacy of the micro-organisms in the Thai environment, the system was not adopted widely in Thailand.

[225] T. Udagawa (1993)
[226] Y. Matsumoto (1993)

Another system promoted was permaculture,[227] which is based on chemical-free integration of forestry with agriculture, a multi-crop mix, and hydroponics linked to aquaculture. This too had limited impact in Thailand, possibly because it is hard to distinguish its benefits from those of existing integrated agriculture. Farming systems research and extension approaches in Thailand have also embodied elements common to alternative agriculture. One successful alternative agricultural approach seems to be organic farming. Hardly new in any traditional agricultural society, its modern guise was foreshadowed in Thailand in the 1950s,[228] and expanded to the use of natural fertilizers, nutrient recycling, and weed control without industrial chemicals to service a middle class market. The fact that the Thai symbiotic system of agri-aqua-culture, modified to use only low levels of industrial fertilizers and pesticides, has proven culturally easier to associate with Buddhism among both Thai farmers and extension agents[229] itself seems a metaphor for the naturalness and simplicity implicit in the insights of the wise, Buddhist or otherwise.

Perhaps the closest association of alternative agriculture with Thai Buddhism has been through the Santi Asoke sect that adapted Japanese Nature Farming with the additional stipulation of avoiding the deliberate killing of pests through any means including non-chemical approaches. Produce from such gardens is sold through the sect's vegetarian restaurants with profits allocated to charitable activities. Adoption of this alternative agricultural approach will remain restricted to members of the

[227] B. Mollison (1988)
[228] H. Smith (1969)
[229] K. Wetchaguran (1980)

sect at best, as it integrates with the sect's substitution of work for meditation.[230]

Another alternative is to reduce input costs rather than binding small farmers solely to chemicals, credit, and forest encroachment to produce commodities such as cassava, sugar, and kenaf which offer declining returns in global markets. This is really a simple step backward to recognising the continuing small-holder system that is based on producing one's own family food without major chemical inputs in an integrated farming system – and it is this that has been described in Thailand as one element of self-sufficiency.[231] Popular Buddhism's apparent valuing of society, physical work associated with producing one's food, and a broader philosophical understanding of the true nature of the world, appears to offer a means of enhancing such small-holder agriculture.

Small-holder agriculture has been ill served by the systems which supported the separation of man from nature through destruction of forests, and adopted foreign culture without valuing the loss of traditions – and has led to abuses of power.[232] Seeking a balance between social, spiritual, and material needs and maintaining cohesiveness of connections between human beings, the environment and the various aspects which make up life has caused a realistic consideration of small-holder self-sufficiency as an expression of peaceful coexistence. Conceptually difficult for decision makers inculcated with Western values, there appears sufficient respect for such a

[230] M. Fukushima (1999)
[231] Wasi, Prawase (1998)
[232] Sakharin, Rapee (1997)

philosophy residual in Thailand for self-sufficient agriculture to be seriously considered in the next decade.

His Majesty the King's support for self-sufficiency provides hope for re-evaluation of the role of small-holder agriculture. Such ancient responsibilities have long been shifted to government and its agents with the creation of a constitutional monarchy and righteous governance may perhaps be seen as the aim of some popular aid approaches to 'good governance'. However, as the cargo-cult copying approaches to industrialization require modification, so may simple adoption of supposed 'good governance' until all elements which contribute to such systems are in place. These include widespread effective education, adherence to common values including environmental values, freedom of information and debate, and active participation of concerned citizens in the political process – all of which seem to be implied in *Mangalasutta* teachings.[233] Self-sufficiency embraces all of these factors across the whole society.

Self Sufficiency

Among the unique aspects of Thai agriculture, Buddhism has a specific role. The distinctive historical, cultural, and political aspects of Thai agriculture include such aspects as; the legal system, patronage-based relationships, assimilative social character, and acceptance of born rank. These have facilitated consideration of self-sufficiency, a bold initiative that would be difficult to introduce in the absence of such a respected leader as the King. In Thailand's case, it offers hope for some traditional values residual in rural Thailand to be expanded as it becomes

[233] Chandra-ngarm, Saeng (1998)

more difficult to promote the Thai identity as having cultural or ethnic uniformity. As in times of crisis when familiar beliefs embodied in everyday Thai Buddhism[234] have resurfaced and moderated behaviour, so the authoritative and religious associations of self-sufficiency should enhance its application in Thailand.

Self-sufficiency in all aspects of Thai life draws on Thai Buddhism, which might otherwise be seen as common sense, in advocating frugality, thrift, self awareness, and lay precepts which were forgotten by many through the 1980s and early 1990s. Redoubled efforts to communicate the essence of self-sufficiency in the wake of the economic crisis have raised general awareness, although perhaps only as lip-service across sectors of the urban elite including the civil service.[235] The concept is now important to a sensible view of Thailand's agricultural sector, and is intended to apply to all walks of life.

Application of the approach to the rural sector was codified in recommendations which aimed to produce sufficient food for a farm family on-farm, and to use limited resources, particularly water, in an equitable and frugal manner. The system would use minimal external inputs and operate within the ecosystem of the present day. Farmland would be allocated, for example, 30:30:30:10 to:

- on-farm water conservation for irrigation, integrated poultry production, aquatic plant production and aquaculture;
- wet rice production;
- cash and other crops including perennial trees, and

[234] B. Terwiel (1976)
[235] Tandhanan, Mallika et al. (2000)

- housing, composting and backyard production.

The Thai self-sufficiency proposal was meant to be indicative rather than prescriptive. It provided a starting point within an overriding theme of sustaining a family without reliance on external assistance and without requiring credit-based links to a distant commercial chain. It further promoted cooperative action within a community reminiscent of Buddhist teachings for self-improvement in such areas as collective bargaining, sharing of capital items, and negotiation with outside parties, which included government officials and commercial interests.

Recognizing the existence of two agricultures in Thailand, self-sufficient and commercial, embodies overt recognition of agriculture as a social support system which has been undervalued since the 1960s. The opportunity for a post-crisis reconsideration of values should now be supporting reconsideration of Thai rural development.

Self-sufficiency for the small farmer may be seen in a global context as a means of easing the burden assigned by participation in a complex commercial industry without adequate knowledge or protection. It may also be seen as an evolution of Thai Buddhism to meet new demands in a manner that recognizes human values. Leo Tolstoy described his anguish of a similar state as 'being carried on the peasant's back while choking the peasant, and yet assuring himself and others of his concern to ease the lot of the peasant by whatever means, except getting off the peasant's back'. Using language almost common to both Buddhism and economics, poverty may be considered to be the absence of an ability to work in a creative and productive manner to look after one's self and one's family. Allowing a self-

sufficient farmer to live in peace while enjoying social services similar to others in the society may represent true development in Thailand. It would also facilitate consideration of environmental care as part of a life-style approach to agriculture that incidentally conforms to Thai Buddhist principles – and that would be sustainable.

So, consideration of the Thai case study produces some additional information, at least in a practical way, though it brings us only part of the way toward a new form of sustainability. Perhaps sustainability really is an illusion – and it is this possibility that is discussed further in the following chapter.

Chapter 9

Nature and Sustainable Agriculture
A Consideration of Technology and Ancient Wisdom

nature glimpsed by scientists sane,
can ignorant bonds sunder

The arguments so far have followed conventional if not popular forms and as a consequence have only alluded to additional knowledge critical to the subject. Two sources of knowledge inform all discussions, rationality including the technological understandings of science, and the insights of the wise. To consider sustainable agriculture within a modern technical paradigm has led us to a perpetually uncertain attempt to sustain an output by constant technological innovation. Comparing modern technological approaches with millennia-old insights, beginning from the Indian classical period, indicates that sustainable agriculture, like other human desires, produces outcomes according to the wisdom of each act. For modern agriculture, this suggests that we should not seek sustainable agriculture where other, singular or multiple, motivations such as profit are paramount, but rather look to those activities that value a wider range of both tangible and intangible products. When we consider the diverse meanings attributed to the term 'agricultural sustainability', we can also consider non-rational insights into the natural world, and this leads to the conclusion that sustainable agriculture can be achieved, but is unlikely to result from many of our current approaches.

Our Current Knowledge

The heritage of Asia introduced in Chapter 2 has been woven through each chapter. The false views that we have built on narrow rationalising and our consequent blind grasping for sustainability have similarly highlighted a missing element from our actions. Indeed, by this stage we may well ask - why seek sustainability, even if it is elusive? Even though we seem to agree on some reasons to seek it, can we realistically expect such an outcome as sustainable agriculture to exist? The first question has both obvious and less than obvious answers, while the second challenges the premises on which modern agricultural science is based.

This chapter discusses the first question as a context for answering the second. It aims to alert persons concerned with the natural environment and sustainability to the deep understandings that have been obscured from, and are a corollary of, modern sophisticated technology. These two forms of knowledge are introduced first and are followed by a distillation of definitions of sustainable agriculture from the mire of conflicting political objectives that has obscured the field; references and notes provide indicative references for the more earnest reader. Overall, the chapter reflects a concern to relate historical and current form of true wisdom to the processes of technological science; while it reflects an orientation to some traditions, this is simply as a convenient explanation of insights of all traditions. Similarly, the argument, while based on agriculture, applies widely to sustainability.

Agricultural science is a modern phenomenon, notwithstanding its easy appropriation of soil science principles from the Greeks,

such technologies as the nitrogen fixation by legumes and soil amelioration by lime from the Romans, the genetic principles deduced from Mendel's colourful pea flowers, and millennia-old irrigation technologies. Searching for historical continuity, however, far from belittling what is increasingly a Cinderella-science, provides a context that expands understanding of its environmentally influential technologies. Such a philosophical approach to agricultural science provides a wider kit of tools for understanding nature and agriculture than is commonly considered adequate for technological innovation. Most such discussions use the rational and rule-bound approaches of *scientia* common to technology generation when considering the viability of such concepts as sustainable agriculture. This both prejudices the outcome and marginalizes agricultural science from the greatest of human insights.

As a convenience in explaining the frameworks of human understanding available to address questions of sustainable agriculture, the historical origins of agriculture may be simplified to show it as the source of what we value about being human. Agriculture did not begin at any single point or time; it was a simple, innocuous, and incremental human modification of the natural environment, which produced exceptional human benefits. The stability created by such simple innovations as mud barriers to retard receding flood waters allowed large and stable settlements, food surpluses, differentiation of labour between persons and seasons,[236] and also fostered development of the unique human faculty of spiritual understanding. Thus, two forms of understanding arose with the emergence of agriculture, which may be expressed in Western (secular and theological)

[236] L. Falvey (2000a)

language as, one that we see acting in rational innovation applied to environmental modification - *scientia*, and the other, which we may call spiritual insight – *sapientia*.[237] The distinction between *scientia* and *sapientia* is made by, among others, Thomas Merton who uses it to describe the different routes taken to knowledge in universities and monasteries. Western writings on Buddhism translate a similar concept as relative and ultimate truth. An interesting comment on the value of current technological innovation from a unified perspective is as a 'major contribution to minor needs.'[238] .I return to the aspect of *sapientia* throughout this chapter in the guise of Indian insights; however, I first wish to clarify the confusion that can occur between spiritual insights, or true wisdom, and religion as each relate to agriculture.

We may, for this discussion, separate 'religion' as a culturally-based belief system from 'spirituality' as matters relating to the individual that conduce to 'wisdom' from 'insight' or 'enlightenment'. The fears of primitive man arising from unpredictable events that were modified into beliefs revolving around nature, spirits in the natural environment, and gods on whose favour depended a successful crop may be seen as primarily religious outcomes in today's remnant ceremonies. Such rites orient farmers to their environment, protect sacred forests, and engender generosity through harvest rites, although they are daily being displaced by the technological innovations of agricultural science with its potential to control gods and pests, and guarantee higher crop yields, at least in the short term[239].

[237] L. Cunningham (1992)
[238] J. Revel and M. Ricard (1998)
[239] R. Lando (1982)

The two aspects, spiritual insight and religious beliefs, provide an inkling of the missing essence of knowledge in modern agricultural science. The heightened technological confidence that enables human manipulation of the environment today has removed the unknown so that all can potentially be explained and nothing need be feared. The demise of traditional agricultural ceremonies is usually described nostalgically but with an acceptance of its seeming inevitability. However, if one is to pine for lost perfection, it would be more logical to decry the separation of agriculture from natural environmental cycles and actions.

Civilisation, enabled by settled agriculture, provided societal support to spiritual enquiry, a tradition most readily studied from ancient India, but still discernable in ancient Greece where is was linked with rational investigations to a greater extent than is usually acknowledged in today's Western-led science. Peripatetic seekers of truth, who ranged from India to the Mediterranean, probably connected such forms of enquiry.[240] Although less well understood within their culture, the Christian mystical traditions offer insights remarkably consistent with those of India, and indeed other cultures. A link between spiritual insight and practical teachings relevant to agricultural science is evident in Indian traditions as a result of long-term society-wide acknowledgement of a human spiritual dimension and its cultivation as the highest pursuit. From this period of widespread knowledge creation from *sapientia*, insights unrelated to the dogma and fears of religion evolved into an understanding of nature and the psychology of *Homo sapiens* (the related word providing an apposite reminder of the capacity of

[240] R. Abraham (1994)

human consciousness) themselves, and their essential interactions.[241]

Ironically, science's banishment of superstitious fears in agriculture has its nemesis in a new fear, the fear that science may not be able to solve a new problem or even worse, that what has been achieved may be lost, and the system thus proved unsustainable. Such fear of loss of an object or idea to which one is attached has long been the subject of experiential research – in the form of spiritual development through mental training rather than the recent 'systems thinking' use of the term - and provides clear insights that can inform sustainable agriculture. Mental training for spiritual development from which insights gained from personal experience (elsewhere termed *sapientia*) forms a critical component of, among other traditions, Buddhism.[242] The natural order of things revealed in such teachings provides an explanation of what sustainability really may mean. However, to narrow the conceptual diversity of the field of sustainable agriculture for this discussion, some commonality of interpretations is first useful.

What is to be Sustained?

There seems little point in adding to the voluminous literature defining specific meanings for sustainable agriculture. Meanings vary according to usage and political manipulation, as they probably should and inevitably will. Rather, this section elicits a commonality among interpretations to facilitate further discussion of the concept of agricultural sustainability from both insightful and technological viewpoints.

[241] C. Queen and S. King (1996)
[242] Payutto, Prayuth (1995)

'Agricultural sustainability' is used variously to mean maintenance of profitability, income, or economically productive capacity, in what may be loosely termed financial sustainability; it is also used to describe technical, political, social, and environmental sustainability within agriculture.[243] Technical sustainability usually refers to the durability of a proprietary agricultural technology or a process of ever-evolving technologies capable of delivering specific agricultural outputs. Political sustainability usually refers to maintenance of a stable situation through agricultural policies that, for example, reduce rural to urban migration, or balance security concerns with social equity, sometimes extending to intergenerational equity. Social sustainability may be part of political sustainability, or transcend formal political boundaries as it seeks to maintain cultural and traditional identities through continued practice of, for example, specific farming approaches.

'Environmental sustainability' is ambiguously used in agriculture to invoke an aura of environmental care or to describe the reduction of mechanical, chemical, and bio-technical inputs to levels that do not obviously affect the natural environment. Expressed as 'environmentally sustainable agriculture', it evokes an ideal for which criticism is presently unfashionable. It may be seen as a higher moral order than other expressions of agricultural sustainability, yet, as I argue below, it shares the common flaw of these conceptions of sustainability. Ecologically sustainable agriculture within institutional programs has inadvertently adopted the assumption that agriculture is practiced in a fixed snapshot of an understood and

[243] J. Anderson (1993)

balanced ecosystem, rather than the evolving set of unintelligible systems influenced by innumerable variables, some as remote as distant space events. Moreover, it continues to study ecosystems as if humans are not a major influence on their variations.

Environmentally sustainable agriculture is portrayed variously in such terms as; lessons from history, benefits to human lifestyles, interpretation of religious dogma, and spiritual understanding. The historical perspective often portrays traditional agriculture as an exemplar of the environmental sensitivity that leads to sustainable agriculture; the truth is that many ancient agricultural systems as presented are myths – many disappeared without trace, although some appear to have been sustainable for hundreds or even more than a thousand years - and all relied on significant modification of the natural environment to create a new agricultural ecosystem. For example, the agriculture supported by the small-scale rice irrigation systems of the Tai in southern China and Thailand endured for a millennia until modern rationalist approaches intervened. By way of contrast, the larger-scale diversion, pond and swamp control of the Khmer system associated with the Angkor Wat civilization in Cambodia succumbed to siltation within a few hundred years. Where sustainable systems appear to have existed, integrated social, religious, and economic systems were critical to continuity, and individual motivations included some form of spiritual orientation. In more recent experiences, the Green Revolution is a frequently, and often naively, used example of social and technical success in feeding more people, but an environmental failure in its reliance on unsustainable water, chemical, and bio-technical interventions.[244]

[244] G. Conway (1997)

It is from such latter-day experiences that agricultural sustainability has assumed a problem-solving mantle.

Concepts of benefits to human lifestyles from environmentally sustainable agriculture erroneously link the urban health consciousness of wealthier nations to reduced fertiliser and pesticide use, and increasingly, to guarantees that food products have not been genetically modified - other than by traditional breeding techniques. Perhaps less erroneously, religious particularly Christian dogma has been re-interpreted to emphasise stewardship in place of nature-dominance to create a shift in public morality.[245] The information imparted from non-rational, or mystical, understandings also appear to support environmentally aware actions, although its primary manifestation in Western traditions is likely to be as unintelligible in worldly situations as mystical statements have been in the past. The attraction that the modern West seems to exhibit towards Eastern philosophies appears to be influencing Christian dogma and, though formal religion may be declining in social influence, it provides a means of understanding spiritual insights of possible relevance to agricultural sustainability, as is discussed in the following section.

One further moral argument dear to agricultural science requires mention – global food demand. Feeding the rising global population is sometimes portrayed as regretfully requiring subordination of environmental principles to the maximizing of agricultural output. Elsewhere I have attempted to link population and responsibility for environmental care as the prime context for re-orienting agricultural education and

[245] R. Banks and P. Stevens (1997)

research.[246] Without diminishing that message, I now seek to separate myself from the falsity that these moral and environmental objectives are the motivation of agricultural science research; rather, research is clearly driven by business and trade objectives, which we should not expect to highlight social or spiritual values.

The facts are, the world produces sufficient food for today's population and has the capability to feed projected peak populations of the various global models. The continuing nutrient-deficiencies of marginalised peoples are attributable to food distributional failures, denial of rights to produce food, and deliberate exploitation policies.[247] These statements are less controversial among current protagonists of increased agricultural research than they may first appear. Indeed, funding arguments are now shifting to the need for more environmental research to allow maintenance of production from more environmentally sensitive agriculture. One might assume that this represents a desire for sustainability, and to an extent it does in a manner essentially similar to that of each of the above arguments for sustainable agriculture – but all also assume that current systems and hierarchies are maintained. The underlying motivation of this approach to sustainability is to ensure continued control and stability, which is reliant on continued human technological innovation. To understand more of the viability of sustainable agriculture, we must ask - are such motivations and approaches consistent with knowledge of the natural world?

Insights into the Natural World

[246] L. Falvey (1996)
[247] A. McCalla (1998)

Conventional concepts of agricultural sustainability fit within a broad societal belief in science as a process that delivers technologies to meet human needs. This article of faith in *scientia* has been daily confirmed in individual lifestyles. Less obviously, although no less logically, the experiential research (*sapientia*) of spiritual searchers over millennia, which has been translated into every day language as teachings and moral guidelines, warrants similar belief.

In seeking to understand sustainable agriculture, this chapter therefore accords *sapientia*, in the form of spiritual insight, at least equal credibility as faith in *scientia*. In the introduction of this chapter, and elsewhere in this book, I have noted that agriculture allowed the development of civilisation, a primary output of which was the development of human potential for deeper understanding of all things as conducted by spiritual practitioners who undertook experiential research. The close integration of such insights and daily life that has continued in the Indian-derived traditions of Jainism, Hinduism and Buddhism provides an intellectual and spiritual linkage to discussions of sustainable agriculture.

One might take any of the Indian traditions to illustrate the points made in this argument; most of the examples referred to in this chapter are taken from the 2,500 year-old insights of Buddhism and their specific descriptions and understanding of the operation of the natural world - hereafter referred to as the natural order. Failure to act in accord with the cycles of 'laws' observed in the operations of nature is one description of the cause of the human condition of unsatisfactoriness, which is sometimes translated as 'suffering' but also embraces such

modern terms as frustration, stress, disappointment, anxiety, and unpleasantness. The source of these is understood as unwholesome desire - such as desire for specific outcomes or sustained personal comfort. These insights are beginning to be more widely appreciated in the West, as indicated from the growing body of popular and learned Buddhist texts in the English language.

One representative text is a collation of informed articles about Buddhism and the natural environment edited by Mary Tucker and Duncan Williams and published through the Harvard University Center for the Study of World Religions.[248] It discusses a range of teachings, from extensions of moral guidelines to interpretation of deep insights, and consequently it reflects a diversity of understanding of Buddhism in the West. For example, attempts to extract practical environmental lessons from Buddhism have claimed frequent scriptural references to forests as an environmental care message, although the Jataka stories to which they usually refer depict forests as infested with thieves, wild animals and malevolent spirits, and as such conducive to confronting personal fears, which is their primary lesson rather than veneration of nature *per se*. The original Buddhist texts, known as the Tipitaka or Three Baskets, include these Jataka stories of the Buddha's previous lives, each of which presents a moral lesson. Some of these stories may be also be found in Aesop's Fables.[249] In presenting such a breadth of learned opinion, the Tucker and William's collection assists the reader into an understanding that many references to natural phenomena should be read in the context of the natural order of all things, which the insight of Dependant Origination as

[248] M. Tucker and D. Williams (1997)
[249] Some examples include Jataka 1: 332; 2:145,335; 5:469-470.

discussed below, and its conclusions of non-self and impermanence, which are obviously critical aspects of any sustainability discussion.

In the West, environmental advocates appear to emphasize practical ethics derived from Indian religions above the mental developmental element of insight. They thereby downgrade deeper teachings to popular views of interconnectivity explained in terms similar to ecology. This can be appropriate as a first step to understanding, but insights concerning interconnectivity contain far more than ecology. These traditions advocate balance between simultaneous and systematic cultivation of the independent fields of morality, meditation, and wisdom, rather than isolated intellectual exegesis or syncretism between Western science and Eastern ideas.

The development of higher forms of consciousness that is central to these traditions induces higher ethical, including environmental, sensibility. Such concepts are embedded within the insight of Causal Dependence or Dependant Origination (in Pali, *paticca samuppada*), a teaching that among other themes explains psychological processes that allow and support the illusory states of the everyday life of the unenlightened mind. However, as Alan Sponberg writes, popular interpretations of interrelatedness and Dependant Origination can become little more than mantras or intellectual stances. "What Green Buddhism needs to explore more thoroughly is the Buddhist principle that meaningful change in our environmental practice can come about only as part of a more comprehensive program of developing higher states of meditative awareness, along with the increased ethical sensibility which this evolution of

consciousness entails" Thus Sponberg[250] maps the landscape that the other chapters of the above referred anthology populate – his other writing further separates the ethical trees of Western Buddhism from the forests of overall understanding through insight, as intended in the complete message and methodology.

The short history of an ancient Indian approach seems fertile ground for comparing ancient and new interpretations, and can provide a context for, and a contrast with, the iterative understandings and cultural accretions of Asia in the face of global forces. Examination of interpretations of insights within Asia, so far as may be possible from our secular perspective, may therefore further benefit our understanding of sustainability.

Insights into the natural world indicate the essentialness of variations, cycles, arising and decay, and the sublime state of living within, understanding, and accepting that process. Teachings of impermanence, false psychological attachments, and common misconceptions support both Dependant Origination[251] and Conditionality (in Pali, *idappaccayata*, which relates to understanding of the arising and declining of conditions in all things as the determinants of constant change in a manner more complex that may be intellectually conceived).[252] Dependent Origination, which applies to all phenomena, may be explained as an instantaneous cycle in the example of the everyday unenlightened minds; it begins at any point of the cycle, such as ignorance of the cycles and 'laws' of nature, allowing a mental formation such as sustainable agriculture to be conceived and engage mental and physical effort, sensory

[250] A. Sponberg (1997) Pages 352-376: 374.
[251] Buddhadasa Bhikku (1992)
[252] Payutto, Prayuth (1995).

involvement, and a craving for the realisation of the concept. Identification with the idea leads to disappointment when it fails to achieve all that was imagined, until a new mental formation arises and a new cycle begins. Its application in a more modern context has been variously explicated; one clear example is that of the Thai monk, Buddhadasa.[253] We may conclude from such explanations of the natural order that our secular life is often inconsistent with the natural order and, that such inconsistency always produces consequences or conditions which influence other outcomes; this is the source of the concept of karma, which simply means and refers to 'actions' and their effects. The essential question of agricultural sustainability could thus be articulated as, 'is the action consistent with the natural order?'

The natural state of the agricultural environment is one of pests, climatic and weather variations, and human actions. The last of these aims at sustainability but has also led deep ecologists,[254] who value ecological integrity above human aspirations, to view agriculture as essentially negative in all contexts. A potential outcome of such thought is that a moral action to maintain the environment may sacrifice humans. This view does not seem to occur in Buddhist or other Indian texts, which so far as I understand them, generally accept the privileged position of humans among sentient beings in terms of consciousness, and their associated responsibility to act ethically and to pursue personal development for greater understanding. From resultant spiritual insights, they offer practical moral teachings, which include environmental actions as well as the deeper insights of the natural order. Similarly, teachings of non-violence, non-harming, non-aggression, compassion, broadmindedness, and

[253] Buddhadasa Bhikku. (1992).
[254] A. Naess (1973)

kindness, for example, are more easily associated with moderate environmentalists, yet may be more far-reaching as they incorporate the functionality of both the objectives of behavioural change, and the fruits of insight.

The natural order is often invisible in worldly life - this is one reason for ethical teachings or guidelines for everyday existence. The emphasis of Buddhism, for example, on the cause of suffering links these guidelines to examination of one's motivation in an act or thought, and this is the fulcrum on which a discussion of true agricultural sustainability must balance. If our motivation in seeking to sustain an agricultural system is selfish in any form, from personal gain to gaining advantage over others in a competitive arena, our actions will tip the balance toward unforeseen outcomes, including human pain. Single-minded business motives allowed to transcend personal ethics would seem to produce the same result. On the other hand, motives to work within the natural order appear to accord with sustainable agriculture – so it is not an illusion.

Of course, this insight of a natural order may be challenged in terms of the relative position of humans. As part of the natural world, it might be argued that human acts are *ipso facto* natural. Indian traditions appear to accept this logic and simply use it to illustrate that karmic consequences are also part of the natural order.[255] Humans mainly differ from other beings in terms of their potentially superior consciousness, which allows them to understand more of the natural order. Humans may, by their very human-ness, also be the only beings subject to the 'suffering

[255] Payutto, Prayuth (1993)

of change' - and the desire for sustainability may be an attempt to escape this suffering.

In Chapter 5 I have argued that these ancient insights also offer an alternative conception for third-world development. Practical approaches for worldly activities based on such ancient insights contain the concept of four basic human rights that a moral governance system should ensure. With availability of these four - food, shelter, clothing, and basic health support - individuals have the opportunity, and would be encouraged by the example of leaders, to seek a deeper understanding of the natural order. The similarities to the Western development model of ensuring basic socio-economic security to citizens might seem real; however, the comparison is better informed by the critical difference of the Western model's reliance on competition, gain, and individualism to motivate behaviour, compared to the alternative model's seeking to align motivation with understanding and acting in accord with the natural order of all things.

This short and eclectic journey through modern interpretations and documented insights and their derived teachings offers the prospect of agricultural sustainability being a viable concept, and leads to the question; 'can our institutional approaches to sustainable agriculture be consistent with the natural order?'

Sustainable Agriculture in the Natural Order

As the desire for sustainable agriculture seems to emanate partly from reactions to visible environmental degradation caused by technological agriculture, we might consider both modern interpretations of perceived sustainable agricultural practices,

and their compatibility with the natural order of all things. Modern interpretations of sustainable agriculture focus on maintaining the natural resource base, which embodies care to minimize pollution, erosion, or over-use of any resource. Laudable as these principles are, their relevance to sustainable agriculture within the natural order pivots on the motivation behind protection of the resource base. This does not mean that reduction of the current significant and widespread agricultural pollution, for example, is not beneficial. It does mean that the effects of trying to reduce pollution may be confounded by conflicting objectives, such as market protection, profit maximisation or maintenance of inequitable labour rates across borders, now all factors of global agriculture.

Can modern agriculture be compatible with the natural order? It would seem that the answer must be 'yes – if agriculture is conducted within the natural order of things'. This means that each agricultural modification to the environment would acknowledge the variations and cycles that are the first target of environmental modification in agriculture through such innovations as glasshouses, irrigation, ploughing, and weeding; these contribute to production increases and, that important element of sustainability, predictability. Of course, each such act of environmental modification produces conditions for other karmic outcomes; so how would one make sure that modifications are compatible with the natural order of things? The answer seems to be – 'with the insight of wisdom'. This is the reason for the ancient and repeatedly confirmed conclusion that personal spiritual development, or if you like, mental training and discipline, should be widely encouraged. The alternative is actions conducted without wisdom to foresee and balance possible outcomes. Considered from this perspective,

there is no need for any Luddite abandonment of technology as part of sustainable agriculture, or even to argue for a universal return to primitive agriculture; there is, rather, a need to develop and use technology wisely in more than a worldly sense. The recent emergence in mainstream agricultural science of calls for 'whole-of-system' or 'holistic' approaches that consider interdependencies across social, environmental and economic factors may be a small step towards a form of 'wisdom'.

The above conception of 'spiritual' or 'mental' development as the means of gaining wisdom may seem analogous to modern education. And indeed, agricultural science education has evolved to include an ecological understanding with at least an appreciation of the biological interdependences of all organic and some inorganic forms. However, the short-term and financial orientation of richer societies, as well as direct forces of funding reductions, personal and corporate influence, and the declining popularity of agricultural education and science in many countries, have compromised its balance and led to an emphasis on application of technology within a profit orientation. In this context, agricultural inputs, including genetic material and processing, are controlled by corporate entities, which have been created primarily to maximise returns for shareholders. This might be consistent with the natural order if the motivations and actions of each party, from shareholder to educator, were informed by insightful wisdom - or, in the absence of personal understanding, by faith in the moral guidelines developed by the wise to accord behaviour with personal spiritual development.

Modern education might therefore be seen to have substituted for the mental niche that wise advisors recommended for spiritual development. In rational terms, this might seem to be

rectifiable by the introduction of compassion, kindness, morality, and philosophical input to these technical courses, but in the absence of real insights, these would likely be overpowered by emphases on the competitive, individualistic, profit-oriented model. So, while technological agriculture may be potentially compatible with the natural order, one might well ask – 'is it at all likely that modern agriculture would adopt these preconditions of sustainability?'

Is Sustainable Agriculture Likely?

The tone of this chapter and continuing trends of private capture of natural resources imply a negative response to this question. If technology is linked to motivations inconsistent with the natural order, or even at a simple secular level, to self-serving definitions of sustainability, no sustainable agriculture is likely to exist – this might be the case for agribusiness motivated primarily by profit, whether in the long or short term. This conclusion must apply to both business and the non-government and government institutions that support it.

In this circumstance, our attempts at agricultural sustainability are likely to follow the current approach - a technological emphasis oriented to production and profits with a subordinate consideration of technological means to mollify the contingent environmental effects of that primary focus. For some engaged in education and research specific to sustainable agriculture, it may seem that this observation undervalues their impact. This may be correct, but funders of these fields have similarly undervalued them, which is one cause of the field's subordinancy.

The Academy of Technological Science and Engineering's annual conference of 1999 opened with the important argument that economic sustainability needs no specific focus by government, as the model within which society operates ensures that this is ever sought;[256] rather, the technological need lies in environmental or ecological sustainability, where no widespread interest can be personally captured. Significant in its technological context, the argument did not seek to consider spiritual insights about motivation. Thus, the creation of incentives through market mechanisms as rewards for ecologically sustainable actions, as advocated by some economists, is not the ultimate answer, as these appear to be a simple extension of commoditisation of the natural world. While they may positively influence one behaviour, they create value which an owner or manager may then seek to increase and sustain, and also serve to further encourage financial gain as a noble personal objective in its own right. In some cases, the environmental outcome from such incentives and from self-modified behaviour might seem the same, but in fact they differ in their degree of motivation to work within the natural order, and of recognising other elements of life as having an intrinsic and non-monetary value. The motivation in seeking ecological sustainability appears at least superior to that of creating owners of nature, but remains inherently limited by ignorance according to the lessons offered to us by the wise.

This discussion of the viability of agricultural sustainability introduces apparently naïve concepts to the debate, notwithstanding Buddhism's orientation to scientific investigation.[257] However, India's long tradition of human

[256] D. Nicklin (2000)
[257] J. Revel. and M. Ricard (1998)

enquiry, and for example, Buddhism's continued advocacy of technology, assume that technology is applied to the benefit of all sentient beings, including humans who may then be freed from the fundamental concerns about food, clothing, shelter, and health, and be able to pursue personal development. Likewise, these traditions' interest in natural science has paralleled their emphasis on understanding the natural order, rather than seeking to manipulate it for personal gain. The continuously confirmed insights of the wise are clear in their definition of the source of all unsatisfactory feelings, acts, and circumstances – craving and attachment. Our craving for, and attachment to, the concept of agricultural sustainability has produced unexpected effects, one of which may well be furtherance of an insufficiently regulated competitive societal model that itself undermines attempts at sustainable agriculture.

If the only viable agricultural sustainability is that which is consistent with the natural order as perceived by rare, insightful, and wise persons, then one can argue that it may only be likely to occur in small-scale agriculture where close involvement of the individual with nature is practiced. The tentative post-1997 movement to self-sufficiency in Thailand, as discussed in Chapter 8 and elsewhere, provides some practical approaches to these seemingly theoretical arguments.

Meanwhile, in the profit-before-all-else agribusiness sector, 'agricultural sustainability' increasingly seems to be a description of a 'technological research' cycle to solve production and environmental 'problems' as they impinge on future 'sustained' output, conducted within a faith that all such matters are ultimately controllable by humans. Such an approach to agricultural sustainability represents a self-inflicted cycle of

disappointment, as each 'sustained' scenario encounters 'problems' which the continuing 'technological research' effort must solve in its constant search for a 'sustainable' scenario. One cannot miss the congruity of this cycle with the psychological insight of Dependent Origination mentioned above. Yet, one can still conceive a large-scale responsible agribusiness activity that genuinely seeks to work within the natural order and selects its associates and employees for their orientation to what is usually translated from the Pali and Sanskrit as 'right livelihood'.

It may be argued that I have conflated two levels of truth to create an artificial comparison - ultimate and relative truth; ultimately, the insightful person in the Indian traditions might say, there is no sustainability just as there is no agriculture, no religion, no nations, no duality and so on. However, in the absence of deep personal insights of natural order and in attempting a secular understanding, we are reduced to this relativistic language; therefore the path open to those concerned with sustainable agriculture is to act ethically according to the precepts recommended by the wise. Thoughtful application of such simple precepts can clarify, for example, complex environmental and animal welfare issues in agriculture. Institutions and businesses established to serve other objectives cannot realistically be expected to re-orient to such perspectives, though individuals within them may, and do. For this reason, until we evolve 'right livelihood' agribusinesses, we may better conceive two types of agriculture, one being profit-oriented agribusiness that is by definition unsustainable, and the other being small-scale agriculture that is often ecologically sensitive and sometimes enlightened, and thus sustainable.

This is the actual conclusion as to the likelihood of sustainability being achievable – elusive more than illusory. It may seem negative when compared to the unsubstantiated rhetoric of most modern appeals of science. Some might say that I could have shortened this argument by appealing to the Buddhist insight of impermanence – this is true, but it could have been as easily dismissed as most wisdom in the face of apparently opposing popular opinion, even if it is scientific opinion. That is why I appeal to the Western separation of *scientia* from *sapientia* and strive to find under what conditions sustainability is not illusory. Now, having highlighted various related themes of agriculture and what I have called 'Indian insights', I seek to unify these and present a positive conclusion that should be acceptable to a wider audience – this forms the subject of the following and final chapter.

Chapter 10

An Optimistic Afterword

all is ever here sustained
when we with wisdom wonder

From ancient Asian wisdom through modern global forces and technology to the central environmental issue of food production, we have identified some necessary conditions for sustainability. Yet, our approaches to care of the natural environment seem to be based on erroneous assumptions. We seem to assume the need to compete for resources even if they are not limiting, the necessity and virtuousness of maintaining our current lifestyles, and the inevitability of our Western technological approach as a precursor to a global utopia of sustainable environmental management. While each of these assumptions may be easily challenged, the possibility that they may contain some truth is sufficient reason to consider the conclusions of the penultimate Chapter 9 in the light of everyday practices. In that way, we may posit a conclusion that sustainability is an elusive goal understood by an insightful few while to the majority it remains an illusion - unless our science becomes more insightful.

From Aphorism to Realisation

Using the preceding chapters as a base from which to consider the overall subject of sustainability and science, a brief recapitulation of some points may serve as a short summary. The

discussion thus far may be compressed into aphoristic comment, as expressed in the following points:

- 'Achilles' Axiom' – a technology once developed will always be employed.
- Our reliance on successive interventions in the natural environment seems to be related to separation of our knowledge base from deeper understandings of life.
- Sustainable environmental development implies something akin to acting within the spirit in nature.
- We easily forget that actions based on 'enlightened self-interest' are selfish and often paternalistic, not altruistic nor necessarily equitable.
- Poor self-sufficient farmers should not have to subsidise the lifestyle of the relatively wealthy, yet it is often unconsciously assumed that they must continue to do so.
- Poverty may be considered as the absence of an ability to work in a creative and productive manner to look after one's self and one's family, thus rendering some attempts to alleviate monetary poverty as poverty-producing.
- There seems to be little evidence to suggest that cross-border sharing automatically results from increased wealth being placed in the hands of the relatively wealthy, which is the result of 'increasing the cake' economics.
- In developing ever new technologies we find ourselves caught in a Promethean myth, charged with management of evils we release at the same time as we enjoy the benefits.
- Our craving for stable production systems and lifestyles cause us to fear change and can in fact lead us further away from our quest to 'sustainably feed the world'.

- It is realistic to conceive all new technologies as natural phenomena that establish conditions that will have consequences, with which we shall live.
- Where the objective of applying a technology, even one labelled as 'sustainable', is commercial profit, it is unlikely to make a real contribution to the quest for sustainability.
- To conceive food solely as a traded commodity can easily conflict with the basic right of all humans to food, and cannot be readily portrayed as sustainable.
- What accords with the natural flow or order is sustainable; what doesn't isn't.
- Any society with a balance of material, psychological and spiritual activity may be considered more developed than one with gross imbalances caused by over-development of one or two of the three.
- False views of reality pervade our policy assumptions, including; assumptions of scarcity, the need for continuous economic expansion, individual 'rights' transcending those with less influence, and sustainability as an achievable and minimally disruptive ideal.
- The highest human potential is revealed in the supra-rational insights cultivated by wisdom, which is not always the same as the insights of science when it is defined in narrow terms.

Thus the chapters so far imply a level of ignorance in our mainstream actions – a conclusion that should not surprise us when we realise that we live within social systems that seek stability above all else. From this feeling we unwittingly interpret sustainability as the simple extension of that stability at the cost of other goods. With that realisation, we might act in ignorance

less frequently, and become aware of the conditions that might conduce to sustainability.

From Ignorance to Awareness

Ignorance, awareness, realisation, and other terms yet to come in this chapter will be more familiar to Buddhists than agricultural scientists. This is deliberate and assists the interpretation that I seek to make. However, I do not offer a one-sided proposal that we subscribe to such views, and in fact I see these as merely indicators of our becoming closer to reality rather than as a process to get there. It seems obvious, but let me say it – each person needs to find their own understanding of such matters for them to assume personal meaning. Having said this, let me also express a personal view – as humans, we find ourselves infinitely important, and even in occasional egoless moments, we still find ourselves very interesting. Paradoxically, such interest shows us that we often act mindlessly. While we may decry our ignorant actions, we might just as well consider them to be one more form of natural behaviour, and with such insight, to compassionately point out to ourselves and others that the alternative is always present – it is just often clouded by ignorant desires for some particular outcome.

The three factors of ignorance, greed and ill-will towards other persons or life forms affect us all and are therefore endemic in our society, which explains why we have institutionalised these in laws and attitudes that have pervaded all fields including approaches to science, consumerism, and that brand of competition that purports to 'bring out our best'. A scientist might null-hypothesize that that there is no better way – and in testing the hypothesis, the scientist might become open to the

understandings of the wise. So none of this means that our existing processes are damned – for mature minds build on knowledge and experience wherever they can, and if this is conducted with a sound intent, it must lead one closer to that wisdom.

If ignorance is endemic, then so must be wisdom – for it is the product of the insightful of all generations, and often ignored. For example, wisdom pervades science even as science ignorantly seeks understanding of the whole by narrowly focussing on parts, and it pervades attempts to sustain our lifestyles even as we greedily usurp the rights of other persons and beings to do so, and it pervades competition even as it encourages us to wish ill-will on our competitors. Our ignorant actions, as individuals and as a society, create the conditions that produce or contribute to our dissatisfaction and frustration, because we do not perceive the whole of reality in our decisions. However in reality, as well as being the usual cause for lament, this may also be the event that awakens more of us to the facts that we exist within nature, and have but an imperfect understanding of ourselves in that context. Such a simple conclusion appears to be comforting – so why is environmental discourse so often characterized by despair?

From Despair to Understanding

Our search for sustainability will be self-defeating so long as we seek to sustain an unnatural system. Our attempts might appear to work in the short-term when we allocate to them huge resources in the form of research brain-power and finances, but the very source of such resources themselves is only sustainable if it too can be seen as consistent with the natural system. Rather

than despair of obvious environmental decline and greed, it seems more constructive and accurate to assess whether we are in fact evolving a system that can be self-sustaining under a wide range of conditions – that is, a new sustainable system as sought by applied scientists everywhere.

This may seem a strange argument to put after the preceding chapters have argued for more environmental and general awareness, resurrecting ancient and eternal truths, and conclusions that sustainable agriculture, for example, might only be found in small-holder agriculture. However, it does not seem inconsistent to me, because I find no basis to separate the evolution of which we are part from the past processes of evolution that have always produced new ecological conditions, biochemical processes and other systems. Those individuals suited to each new situation survive – surely this is the basic definition of sustainability; it is also one I would have expected development and technology advocates to invoke, although it may be misunderstood like 'deep ecology'.

If we take this view that we may be heading for sustainability, it is easy to claim that the West's evangelical environmental attitudes contain the truth – but such a claim would be misleading. Just because the human population is stable or declining, or because environmental care is a political issue, or because we recycle our garbage, does not mean that we have had a significant positive impact on the populous poorer countries of the world. In fact, by exporting non-sustainable actions, we not only increase overall environmental destruction but we rob fellow humans of 'rights'.

Popular Western arguments that each country should 'look after its own' are convenient, but unreasonable. Cheap products and differential wage rates ensure that we in the well-off in all countries can live nearer the top of the heap and enjoy the vista of quasi-sustainability of our own backyard. But while we behave unsustainably with respect to the rest of the world, we are as vulnerable as any – perhaps even more so, for we have further to fall than those nearer the bottom of the heap. This simply means that sustainability is a global issue, as has been reiterated by informed parties for the last two decades. But it is not achievable under a system that tolerates the reductionism of viewing one area, or one country, at a time. The interconnectedness of all things from agriculture to architecture is a natural law and we are ever being subject to these, even as all other components of nature change according to its laws.

Under these conditions, how can our actions be oriented to sustainability? I offer the answer that *actions can be oriented to sustainability when impartial individuals act with correct intention and are tolerant of diversity and change*. This may sound glib, but contains an essence of the truth behind all sustainability discussions. For if sustainability is understood to mean that no change can be accepted, it cannot exist. But if sustainability means moving with change, then our human adaptive potential is skilfully employed. In practical terms this means, for example, living with salt in highly saline areas, rather than pretending to understand the dynamics of all the processes that led to salinization in order to devise techniques for removing the salt. It means simpler lifestyles in the West and individual actions being guided by individual morality. This is the context in which we might develop new sustainable systems within the wider natural

cycles of the environment – a deeper understanding of nature and us within it.

From Understanding to Wisdom

Environmental discourse and learning spans the academic disciplines; this is a blessing to science, for it remains too easy, even if sometimes appropriate, to criticise modern science as narrow and solution-oriented, especially the technological sciences that deal primarily with the natural environment, such as agricultural science. Perhaps cross-disciplinary thought will broaden the technological sciences through restoring the lost contact with the humanities, or if you like, placing us back in the environment rather than outside it as external manipulators, such that we realise, as written elsewhere –

> Man in nature, arts *with* science
> the true meaning of *scientia.*

Such interaction will undoubtedly spawn other dialogue, and some even see this as the dawning of a second Renaissance – I do not, rather seeing it as our natural evolution. But I do see wider perspectives opening as old discipline barriers are crossed by broadly educated thinkers – the true scientists, be they originally physicists, psychologists, or agricultural scientists. As the last is my origin, I seize this opportunity to re-emphasize the pivotal role which I feel agriculture plays in the search for sustainability, and for its supporting myths –

- agriculture remains our widest spread intervention with the natural environment,
- we have millennia of experience with this human-environment interaction,

- as a source of all great civilization, agriculture has been integrally linked with the subsequent emergence of thinking and beliefs.

For these reasons, it is logical to link religion and agriculture. As we follow our species' tendency to develop tools and technology, and use these to reap unforeseen benefits, we also discover negative effects, which we then seek to mollify through new tools and technologies. This seems to be a sort of 'tool cycle', one we may consider as natural, if we are consistent in, and aware of, our actions. Such has been the development of agriculture over ten millennia, and in particular, the most recent three – which incidentally coincides with the period of great global moral and spiritual understanding. And lest we think today differs from past centuries, the similarity of approaches used to devise new techniques in agriculture then and now tell us that they differ little in essence. The exquisitely sophisticated agricultural science of today's laboratory still follows the trial and error approach, albeit codified by rules including the scientific method itself. All that has changed is the tools and the pace.

Thus we conclude where we began, arguing for wider consideration of ancient views of the environment, sustainability, agriculture or whatever you like in our development actions. In case I have created the impression that this is simply a 'look to India' approach, let me be clear – the India of which I speak is of the distant past. This is perhaps illustrated by comments of the great figures of modern India, such as Gandhi, Nehru, Tagore and even Krishnamurti, who each criticized the same customs of their own culture that the Buddha once did, such as the caste system and feudal customs. For those inclined to such matters, these ancient Indian insights seem to be expanding rapidly in the

West. For those of us whose indoctrination by the techno-solution ethos or inoculation against religion by experiences with our own culture's religious variants, or who simply feel more psychologically secure within rational thought processes, the philosophical and scientific paths of understanding will often include the ancient Persian, Indian, Egyptian, and Greek traditions. And these were once understood as inseparable from religious insights – for, to paraphrase the West's principle spiritual figure, 'what shall it profit man if he gains a world of technical knowledge and loses his perspective of reality' – and to know reality is wisdom.

Wise Environmentalism

Wisdom surpasses knowledge just as knowledge surpasses gossip – one is not the refinement of the other, but rather a different thing entirely, and with a different objective. Wise environmentalism is the basis of sustainability and it is now appropriate to place it within a context respectful of the best aspects of science. Science explains much of the natural world in its concepts from mathematics to magnetism, from biochemical reactions to biological inheritance, and in so doing it has become increasingly aware of the importance of both initial and ongoing conditions for expected outcomes. This finding is remarkably similar to one level of the Causal Dependence insight that forms the central teaching of Buddhism. That part of science presents this under the rubric of chaos theory possibly serves to indicate the early stage of our rational understanding of such complex natural systems.

My earlier use of the shorthand of reductionist science must now be unpacked to reveal the culprit as not the process of

reductionism itself, but as our mental limitations. We know that reductionism does not readily allow complete reconstruction of the whole with workable formulae developed from its pieces, but when forced to 'predict' something from our work, we have little else to use. But perhaps there is another basis – for the rare thinker that integrates his colleagues work often understands more of the significance of any piece of work than its specialist. This may be where we find our wisdom.

Scientific insight may develop slowly and progressively, or be instantaneous; the processes seem remarkably similar to the descriptions of insight contained in the Buddhist texts. It seems to me that these could be the same experience, and one which creative artists will also claim; if they do differ, it is in terms of degree and breadth – for the Buddhist practices are specifically oriented to cultivating the ability for insight dissociated from the inerasable subjective aspects of science or the arts. Science's reductionism may even be shown to assist this development and sharing of insight in its orientation for ever simpler explanations of all theories – as paraphrased in Ockham's Razor that the simplest explanation is likely to be correct. Such scientific insight does not generally arise from research alone, but from the application of clear-mindedness receptive to intuition. Here we see that the approaches of science itself are a step toward that higher conscious state for which meditative traditions practice. But of course, just as the techniques of meditation may be misused to produce amazing physical feats, so may science's approaches be misapplied to produce unforeseen outcomes. It is from such a circumstance that technological collateral damage impact on the natural environment.

Even with the apparently accelerating rate of scientific insights, we find that, in addition to determining means of addressing issues, we in fact highlight more issues. For example, improved testing for pollutants finds pollutants pervading more natural systems than we previously thought they could; escape rates of genetic material from agricultural plants may be less predictable than we previously estimated. And we are becoming aware that application of technologies without consideration of common sense and historical lessons, such as feeding poorly processed carcasses to related animals, can lead to alarming human and animal health risks. Such outcomes highlight the complexity of natural systems, a factor easily overlooked in methodologies that deliberately isolate factors beyond the frame of study reference.

Systems approaches have sought to address this observation, but perhaps a more significant approach may be seen as the recognition of complex systems as an integrative field of elite science. And if I am correct, this might be seen as one more step toward the insights of the wise across millennia that all things are inter-related, not just those limited to our arbitrary divisions of live and inert – or their phase, location, or taxonomy. Once the implication of universal interpenetration is acknowledged, it is possible to consider that all phenomena depend on conditions in the world considered by science. All things are conditioned – so says the great insight. As it is the unconditioned state that the wise sought, attained and communicate to us as the highest plane of existence, we must at that point see the limitations of science. This is the context of the earlier quoted description of technology as a 'major contribution to minor needs'.

However, I do not feel that we must accept this limitation of science as absolute if we apply the same logic and consider that

the scientific method itself is a product of deep insight into removing the biases of our usually deluded minds. From such an 'objective' approach may be arising recognition of the role of intuition in science, and the seeking of means of its cultivation. This is not the 'brainstorming sessions' of hyper-active industrial research planners, but more the inclusion of reflection and forms of mental focussing in the day of scientists as a personal aspect of their vocation. This is not as uncommon as some may assume. To be the great scientist may be to consider one's whole life as a pursuit for truth, not an occupation ordered by funding, administrative processes or social pressures. It is a lifestyle much as it was for some of those whom we continue to revere, such as Darwin, Mendel and so on. But then, such persons did not seek a patentable technology that could be mass-marketed within two years!

Wise interaction with the natural environment is the product of insight, which may arise from science or other sources. It is expressed as active consideration of all interactions with nature, which if observed in our application of scientific discoveries, would seem to preclude such modern excesses of animal genetic manipulation that produces cows that must be slaughtered after two lactations, chickens that cannot survive outside crowded cages, and reliance on the primary definition of 'stress' in pigs as being reduced rates of meat production. While some may take such examples about animals to mean that meat production itself is a sign of ignorance, it seems to me that we should retain the baby when we throw out the bathwater by accepting such measures of animal stress for example as an insightful step towards seeing animals as suffering beings like us.

The chapter concerning genetically modified organisms notes that transgenic species will become more common and may even be hailed by some as a step toward sustainability. It also notes that this is narrow and self-serving view of sustainability – a form of ignorance. However, in the terms of wise environmentalism, the fact that transgenic animals may exist in a new natural environment means that we must be ever conscious of the complex mutually reflecting jewels of Indra's uniting net. This is a huge leap – for it means that we must see ourselves as part of a complex process, unable to control the process or anything to suit ourselves, except perhaps the tiniest process for the shortest of periods. It also means that our attempts to change natural processes must always produce conditions that in turn produce outcomes that do not suit us. Thus wise environmentalism is not new and is well represented in the *sapientia* form of knowledge of the insightful that we occasionally glimpse as intuition, and as explained in such unusual forms as Causal Dependence.

So what of our question – is sustainability elusive or illusory? We might answer 'it is both, and we must learn from the discussion that ensues'. If the individual insights of wise scientists and others are used by a few persons to develop products to serve the greed of the developers and consumers who seek to sustain their 'rent' into the future, we can be sure that sustainability is illusory. Our usually deluded minds may see this as simply muddling along – win-some-lose-some; but the primary intentions are not conducive to sustainability. The alternative and good news is that we are subject to natural law in the same way as those very things we seek to change, and the homeostatic tendencies that appear as cyclical nature suggest that our excesses at one time will stimulate a corrective reaction,

sometimes using us as the agent. This may be occurring as we realise more and more that our role remains within nature. Thus we, the destroyer become the protector, or even the creator, as captured in the Hindu Trinity and the myths and doctrines of other great religions. In this way wisdom may arise from the karmic fruit of ignorance and produce the overall acceptance that 'to sustain all things is not to subdue change'. So, sustainability is not necessarily illusory, but we will only find it when we accept natural changes and live within them – rather like the perennial 'living in the moment' advice of the wise.

Elusion

To reflect how all things change yet last
is to measure life anew,
to see all man's thoughts as loaned from past –
for no false gods renew!
Now as gods fall, so surfeit soars,
yet we still exploit the poor,
invoking science to yield us more,
while our nature we ignore.
Our superficial civil heart,
belies the beast below,
which of self-delusion makes an art,
admitting but truths shallow.
We crave our touch will life imbue
and in our quest we poison,
spurning spirit, we pain pursue,
though seldom see the reason.
But nature glimpsed by scientists sane,
can ignorant bonds sunder,
for all is ever here sustained
when we with wisdom wonder.

3/03

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