

2. CULTURES, KNOWLEDGES AND DEVELOPMENT A HISTORICAL PERSPECTIVE

An impressive variety of civilisations exists across the globe, each with its own knowledge and value system. Some of these can be traced back more than 10,000 years when agriculture emerged, followed by towns, crafts, trade, scripts and other technologies. Religion played an important role in determining the values, systems of governance and scientific methods on which these cultures were based. This chapter presents an overview of some important ancient civilisations, as well as more recent developments, such as the colonial period, the enlightenment and the present process of globalisation. These historical roots determine the cultural identity, and play a crucial role in the choices of development options of rural communities today.

Some 2.5 million years ago tool-making hominids emerged on the earth, and the first known tools are chipped pebbles from East Africa. Evolutionists believe that around 100,000 years ago, modern man (*Homo sapiens sapiens*) emerged in Africa, and by 30,000 years ago man was present throughout large parts of the world, including the Americas and Australia [Scarre, 1991]. When the last ice age came to an end, some 10,000 years ago, the earth's temperature rose, and allowed people to inhabit its northern parts as well. Ever since appearing on the earth, man has been learning to master the environment. This process started with the use of hand tools, building of shelters and the knowledge of fire, passed through to the development of agriculture, pottery, metallurgy and building of towns and steam engines, and has finally evolved to the use of nuclear power and electronics.

Emerging cultures

Around 10,000 years ago agriculture developed on the different continents: in the Fertile Crescent (the territory stretching from the Persian Gulf to Mesopotamia and Palestine), the Indus and Gangetic Valleys, as well as the plains of northern China. Later, it spread to Central America and the Andes, north western Europe and sub-Saharan Africa. Only the deserts did not allow for farming; here, hunting and gathering, in combination with nomadic systems, exist even today.

The development of the first urban, literate civilisation in southern Mesopotamia, around 5,500 years ago, was to have profound consequences in history. Within a few centuries, similar processes led to the emergence of advanced civilisations in Egypt, the Indus Valley and northern China, which shared certain features. They were centred on fertile alluvial plains with high potential to support an increasing population. The people lived in cities, which were ruled as independent states, or as part of a larger empire, while differentiation of occupations and crafts, as well as international trade emerged. Similar processes took place around 3,000 years ago in the Andean highlands and Central Mexico. The agricultural practices in these different ancient civilisations varied greatly: in Egypt and the Indus Valley the annual flooding was used to provide water and fertility - crops could be planted on receding waters - while in Mesopotamia, China and the Americas,

water scarcity led to the development of irrigation systems.

Trade went hand in hand with the development of towns and craftsmanship. Trade brought Mesopotamia in direct contact with Egypt and then with the Indus. In the Near East and in China, writing appeared for the purpose of keeping business accounts. During the first millennium BC large empires emerged in the Middle East, the Mediterranean, the Indian subcontinent, China, Central America and the Andes. During several thousand years these empires controlled large geographical areas through military occupation and trade relations. Due to a variety of reasons these empires collapsed over time. Polynesia, Australasia, northern Asia, the northern part of the Americas, and sub-Saharan Africa remained largely unaffected by these ancient imperial structures.

Religions and knowledges

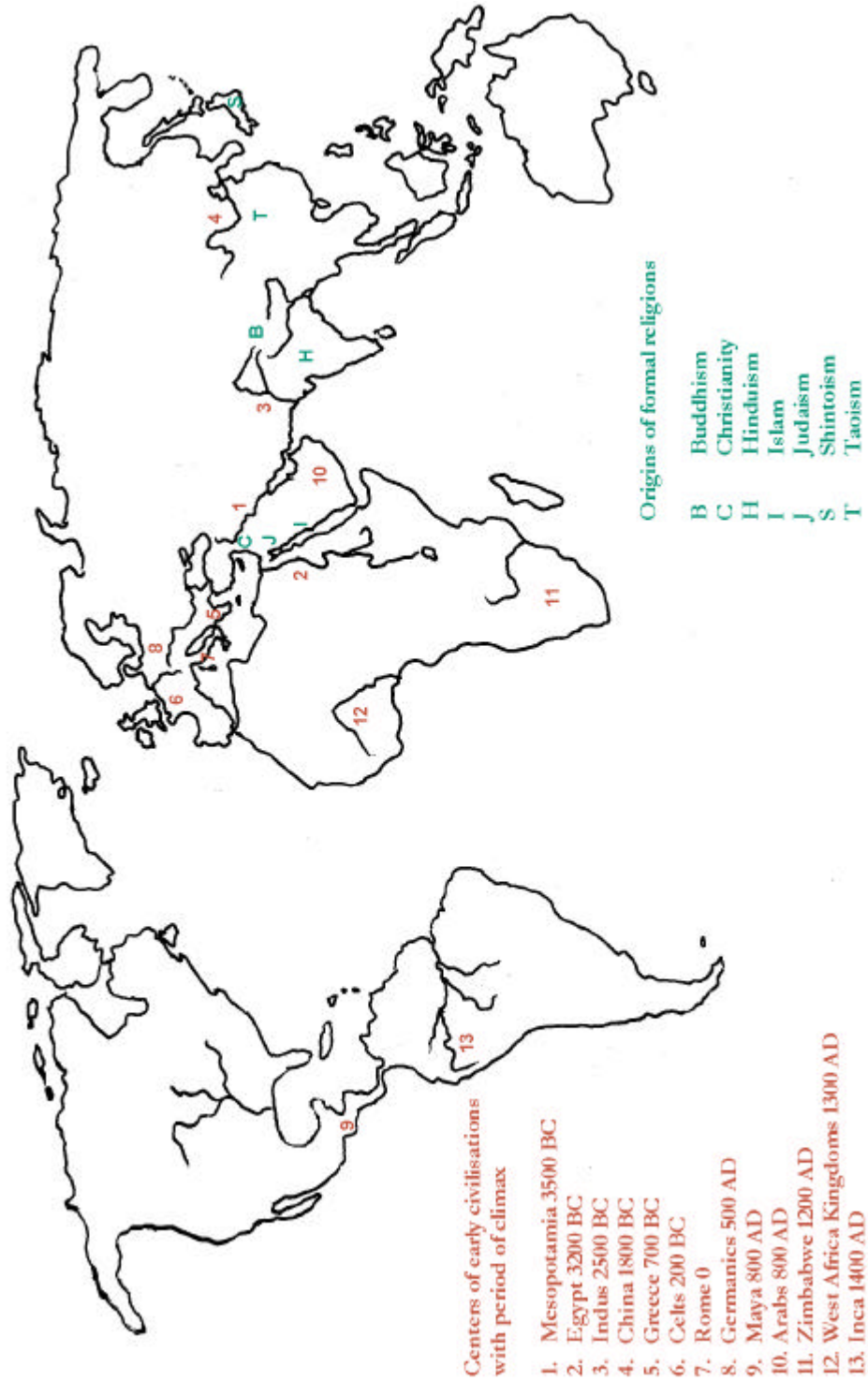
The world has known and still knows a large variety of religions: basic religions as well as formal religions, such as Hinduism, Buddhism, Taoism, Confucianism, Shintoism, Judaism, Christianity and Islam. These religions have largely determined the worldview, values and knowledge concepts of their adherents, including the concept of time, the ideas about destiny, soul and life after death, as well as the relationship between humans, the spiritual world and nature. These concepts largely determine their technologies, ways of doing research, and the way people look at the present, past and future.

Without pretending to be complete, we will briefly outline some basic aspects of the most important religions, as well as the concepts on which their knowledges are based. We use the word 'knowledges' in plural, to indicate that knowledge does not have only one way of expressing itself, but manifests itself in a variety of ways. In the overview chapters on each continent (chapter 4, 5, 6 and 7) we will go deeper into this subject.

Basic religions. The religions of prehistoric peoples embraced a variety of beliefs and practices, including animism, totemism and the belief in many Gods [Hopfe and Woodward, 1998]. Animism is the belief that nature is alive with spirits and Gods that can be communicated with. It is one of the most common religious experiences, both in the early human civilisations and in the various ethnic groups throughout the world today. People believe that animals, trees, stones, rivers, mountains, heavenly bodies, as well as the earth itself, possess a spirit. These spirits communicate, can be flattered or offended, and therefore can either hurt or help humans. People consider themselves dependent on these forces to which they can pray, worship, or make sacrifices for support. Totemism is part of most basic religions, in which a tribe or clan identifies itself with an animal species, plant or natural phenomenon. The totem can be considered as the ancestor of the clan, and the relationship between the clan and the totem often implies certain taboos in eating or hunting the species involved.

In many early civilisations, such as the Egyptian, Mayan, Inca or Celt, enormous energies and resources were spent on building temples, astronomic observatories, graves and places of sacrifice to appease the Gods and spirits. Spiritual leaders were influential, not only in religious matters, but also in governance, justice, education, health, and agriculture. These health and agricultural practices directly referred to the relationship between

Early civilisations and formal religions mentioned in this book



mankind, nature and the spiritual forces. In the present-day belief systems of many indigenous peoples throughout Asia, Africa and Latin America, animism plays an important role, and is often combined with a formal religion.

Africa. In addition to the widespread influence of Islam and Christianity, traditional belief systems are still present in most African societies. Animistic and totemic practices are often combined with ancestral worship and sacrifices to the natural Gods and spirits. Traditional political and spiritual leaders, as well as spirit mediums, play important roles in the daily life of the communities and households. Ethnic affiliation and links with the land, where the family and ancestral spirits reside, are considered important. Chapter 5 elaborates on the African religions in more detail.

India. Besides the animistic beliefs of the different tribal societies, India is the origin of several formal religions, such as Hinduism, Jainism, Buddhism and Sikhism. These religions are based on a belief in many Gods and in a system of reincarnation. The ultimate goal of these religions is to be released from 'the cycle of life, death and re-birth', which can be achieved through appropriate actions of the believer and assistance of the Gods. The divine manifests itself in evolution. The human race, though currently at the top of the evolutionary pyramid, is not seen as separate from the earth and its biodiversity. Hinduism is permeated by a reverence for life and awareness that the great forces of nature - earth, sky, air, water and fire - as well as plant, animal and human life, are all bound together within the rhythm of nature. Hindus believe that all plants and animals have souls and that people should do penance before killing plants or animals for food. Buddhism differs from the other Indian religions as it rejects the caste system, denies the relevance of the Gods and the necessity of worship and sacrifice. The ultimate goal of each individual is to reach 'enlightenment'. Buddhism implies a relationship between humans and nature based on reverence and compassion. Chapter 4 presents more information on the major Indian knowledge systems: Hinduism, Buddhism and tribal animism.

China. Formal religions and philosophical systems from China and Japan are Taoism, Confucianism and Shintoism. Like in other societies, the earliest religions of the Chinese people were based on the animistic recognition of many Gods and spirits, especially the Gods of the Heavens and the Earth, which controlled the universe. In spring and fall the emperors of early China would perform elaborate sacrifices to these Gods, which were intended to ensure the fertility of the soil and bountiful harvests. The ancient Chinese philosophers developed the concept of *Yin* and *Yang* the two opposite forces that make the universe operate. Yin is the negative natural force: dark, cool, female, related to the moon and the earth. Yang is the positive force in nature: light, bright, warm, male, dry and related to the sun. Yin and Yang are complementary, and the balance between Yin and Yang brings harmony and 'life energy', or *Chi*. Chi is believed to exist in all living and non-living things.

Similarly, Taoism, founded some 2,500 years ago, emphasises the natural harmony, unity and spontaneity of nature. Man and nature can be in harmony since both humans and nature obey the same laws. When perfect balance and harmony exists between the Yin

and Yang qualities, growth of all living things flourishes, and Chi enhances the environment. These concepts have developed into a complex science known as *Feng Shui*, which can be considered as an early form of ecology based on the sustainability of natural resources. Taoism also stood at the basis of the elaborate Chinese medical theories and health care practices. The Chinese philosopher Confucius, who was primarily concerned with society and interpersonal relations, called for people to act in a proper manner and to take care of nature. According to him, people could assist the harmonious balance between heaven and earth by leading a moral life.

The most developed sciences in ancient China were astronomy, mathematics, medicine and agronomy. In fact, the science and technology developed in China were dominant in the world before the 15th century. Chinese discoveries during that period comprised more than half of the total number of new inventions, and included the compass, gunpowder, paper and printing. These innovations, when introduced to the west, had great impact on its economic and political developments. The Chinese had special values related to learning: the most important criterion for learning was its usefulness for humanity. This differed strikingly from the ancient Greek, who studied for the sake of knowledge in itself, not necessarily for its direct practical application. [Berger and Yang di Sheng, 1997]. This volume does not provide any further information on the Chinese knowledge systems, because Compas does not work with partner organisations in China.

Middle East. The Middle East is the origin of the Zoroastrianism, Judaism, Christianity, Islam and the Bahai faith. These formal religions believe in one supreme creator God, and in one life on earth. They have a linear view of time and believe in the divine judgement of the world.

Christianity is the largest religion of the world, with almost 2 billion followers, followed by Islam, with about one billion. Both Christians and Muslims believe that creation is the act of God, who continues to take care of all aspects of existence. People have only one life in which to determine their destiny after death: either eternal bliss in heaven or torment in hell. Humans may explore and exploit nature, but may not destroy it: people should act as stewards of natural resources. Values like thrift, planning for the future, and working hard to reach specific goals in this life, were developed and presently dominate in Christian societies. Christian and Islamic religions are dominated by men; women do not fulfil important roles in the rituals and priesthood [Hopfe and Woodward, 1998]. Meanwhile, Christianity has also gone through a number of reformations and changes. At present Christianity presents itself in a wide range of denominations, and its influence on European society is no longer as prominent as in the past. In western cultures the church and the state are separate identities. Christian values, such as the linear time concept, attitude towards nature, and the emphasis on the material world still have a major impact on western cultures today.

Islam was founded as a religion in Mecca in the 7th century AD. Arab armies and merchants carried Islam to the entire Middle East, India, Pakistan, Bangladesh, China, Spain, North Africa, as well as central and south-east Asia. The Arab world has known a period of high scientific achievements from the 7th to the 9th century. Around the year 800 AD, Arab mathematics, geography, astronomy and medicine flourished, and became an impor-

tant source for European scientists. Christian and Muslim armies have been fighting each other in search of political and religious control for several centuries. During the 15th century the Muslims conquered Constantinople and the Christian crusaders were defeated. Northern Africa was engulfed in Muslim missionary activities during the 19th century, as abuses of the Africans by the colonial powers opened the doors to Islam.

In order to be a good Muslim one has to obey what is referred to as 'the five pillars of Islam': repetition of the creed, daily prayers, giving alms, fasting during Ramadan, and pilgrimage to Mecca. For the Muslim, humans are the creation of Allah, or God, and must be obedient to Him. Righteous persons must submit to His will, and humanity's role on earth is that of a *khalifa*, or trustee of God. The earth belongs to God, and He has entrusted mankind with its safekeeping, the integrity of the earth, its flora and fauna, its wildlife and natural environment. The khalifa is answerable for his/her actions, and for the way in which this 'trust of God' is used or abused. Allah is unity; and this unity is also reflected in the unity of humanity, and the unity between humanity and nature. As in all other religions, there are many different ways of experiencing and practising Islam. This book does not provide further information on the Islamic knowledge systems because Compas does not work with partner organisations in areas where this religion is dominant.

Central and South America. In the traditional worldview of the native Americans all nature is alive with spirits. At the heart of nature is Mother Earth, or *Pacha Mama*, who gives life and should also be revered, in order to reciprocate her gifts. This 'mutuality' is seen as an important principle, while good human behaviour and making sacrifices to the Gods are seen as another precondition for harmony between humans, nature, and the spiritual world. Harmony in the cosmos is optimal if harmony exists within the human sphere, the natural-material sphere and the spiritual sphere, as well as between each of these spheres. Mountains, water bodies and other places considered sacred are used as places of worship. The farmland, or *milpa* (central America) and *chacra* (Andes), is considered a sacred place, where animals, plants and human beings live in mutual dependence. Here, traditional farmers have a most intimate relationship with Mother Earth, which is expressed in numerous beliefs and rituals throughout the year.

Early civilisations of the Maya and the Aztecs in Central America, and the Incas in the Andes, built impressive temples that were used for rituals, sacrifices and as astronomic observatories. The *Popol Vuj* is the ancient Mayan text that describes the story of the creation of mankind, in which maize plays an important role as the sacred crop. Similarly, potatoes are considered sacred in the Andes. The Latin American indigenous knowledge concepts include the spiral notion of time, the importance of community festivals and rituals, the sacred aspect of nature, the polarity between opposite forces such as hot-cold and male-female, the importance of bio-diversity, and the mutuality between human beings and other living organisms. The morality of the people is considered an important factor in explaining the processes related to farming, health and community welfare.

These worldviews and concepts are still alive among the native peoples in northern, central, and south America. After the conquest by the Spanish and Portuguese, traditional lifestyles, beliefs and practices have been replaced by, or complemented with Christianity and western values. Also ethnically, most indigenous peoples of Latin America have been

replaced by, or mingled with European settlers. The *ladinos*, or *mestizos*, now form the largest population group in most Latin countries. But, syncretism prevails, and within most indigenous groups, such as Mayas in Mexico and Guatemala, as well as Quechuas, Aymaras and Mapuches in the Andes and Chile, traditional beliefs and religious practices go hand in hand with Christianity. Chapter 6 provides more details on the background of American religions and knowledges.

Western Europe. Some 7,000 years ago, agriculture was well established in western Europe, where its original peoples, such as the Celts and Germanics, built places of worship based on animistic religions. The first European urban-based civilisation emerged in Crete, around 4,000 years ago. The Greek developed an elaborate religion with a pantheon of Gods, semi-Gods, and giants, and laid the basis for modern scientific thinking by the development of 'logic': a system of propositions and deductive arguments. From the 3rd century onwards the Roman empire became the stronghold of Christianity. Western Europe was christianised from the 7th century AD onwards. In contrast to the pre-Christian religions, this new faith was dominated by men, and women could no longer fulfil roles in the rituals and priesthood. This combination of pre-Christian and Greek-Christian worldviews in Europe allowed the emergence of a culture where thrift, planning the future, hard work, and technological enquiry were held in high esteem. Between the 10th and 14th century many universities were founded with theology as their main intellectual pursuit. These values, combined with missionary zeal, led to colonisation of large parts of the world in the 16th and 17th centuries.

The Enlightenment

During the middle ages, the European local rulers were generally appointed, sanctioned or ordained by the Church. The Church also controlled the educational systems and science according to its own dogmas and concepts of life. Scientific insights that were in contradiction to the beliefs held by the church were rejected and scientists presenting such insights were prosecuted. For example Galileo, who provided evidence that the planet earth turned around the sun, instead of the sun around the earth, was condemned by the Inquisition, a church-based court of justice. In the 18th century, a number of scientists decided to work without the limitations imposed on them by religious dogma. Francis Bacon, Isaac Newton and Descartes, considered the founders of modern science, formulated a new scientific paradigm: they shifted from the concept of a world controlled by God to the concept of a material world, which functions like a machine.

Francis Bacon formulated his theory of the 'inductive procedure': general conclusions drawn from experiments can be tested in further experiments. Thus, well designed experiments can force nature to reveal its secrets. Isaac Newton formulated the 'law of gravity', and on that basis formulated the astronomic concept of the sun, planets and their satellites, which are kept in place through the laws of gravity. He developed the prism, discovered the spectrum of light, and formulated the mechanistic worldview. Descartes believed in the certainty or 'absolute truth of scientific knowledge'. His method, also called the Cartesian worldview, is reductionist: all aspects of a complex phenomenon can

be understood by reducing it into parts, and understanding each constituent part. He made a clear distinction between mind and matter, and replaced the notion of the 'divine plan of the creator' by the 'mathematical order of nature'. For Descartes the material universe was comparable to a machine. There is no purpose, life or spirituality in matter. Nature works according to mechanical laws and everything in the material world can be explained in terms of the arrangement and movement of its parts.

Bacon and Descartes agreed that the aim of science is to dominate and control nature, and assumed that scientific knowledge could be used by humans to render themselves the masters and possessors of nature. To describe nature mathematically, they had to restrict themselves to studying those aspects that can be quantified by shape, weight, number or movement. Other properties like colour, taste, smell, and especially emotional or spiritual values were considered subjective projections, to be excluded from the scientific domain. This mechanical picture of nature became the dominant paradigm of western science, and from then on guided the scientific observations and theories in the western world. This new paradigm is called Enlightenment, as it implies an optimistic view on the potential of the human being, based on its rationality. In this perspective, humans can use science to dominate and control nature. Through western dominance, this paradigm was to become a central element for science and development across the world in the centuries to come.

Process of colonisation

Throughout history, Christianity and Islam have been particularly active in their missionary activities. The Christian missionaries within Europe were led by the Church of Rome. As on other continents in their subsequent invasions, in Europe too they were faced with a widespread animistic belief system of its original inhabitants, in which worshipping different Gods and spirits, the sun and other elements in nature, were common elements. The strategy for gaining control over these indigenous western European peoples, such as the Celts and the Germanics, shared similarities with that of the conquest of the Americas, Africa and parts of Asia by European Christian nations, and the Muslim invasions in other parts of the world.

Strategies of colonisation. The colonising empire would build up an economic and military power with a strong link to its religion. The indigenous cultures and religions of the colonised peoples would be declared inferior, and their belief systems 'superstitious'. The new religion would then be presented as a means of liberalisation for the colonised peoples and as a benefit to them, which in turn justified the domination over them. The indigenous populations of Europe were called 'barbaric' by the Roman colonisers; similarly the black people of Africa and the indigenous populations of the Americas were considered inferior by the Europeans colonisers.

Many dominated cultures that were confronted with powerful intruders, perceived the actions of the latter in terms of their own constructs of the supernatural, and thus subdued to them. In the conquest of the Aztec Empire, for example, the Spanish invasion leader Hernan Cortes, as well as the horses his soldiers were using, were considered to be supernatural powers. Their arrival had been predicted by traditional seers and was there-

fore welcomed by part of the people. In other parts of the Americas, as well as in Africa, the native peoples considered the missionary priests as shamans, and their books as tools to manipulate nature and supernatural forces.

The colonising power would make alliances with the local political leaders, while legal systems were forced to take on board the new morality and values. At the same time indigenous traditional leaders were declared demonic, clairvoyant women were called witches to be prosecuted and killed, while non-believers in the new religion were convicted. During the Christian colonisation of Europe, and later on in the Americas, a church-based court of justice could condemn and punish - even to death - those who practised traditional 'heathen' rituals, or those who did not comply with the laws of the church. Colonial rule in the 18th and 19th centuries often included laws to forbid witchcraft in African colonies. Sacred places and places of worship of the original religion were destroyed and replaced by churches on the same location. For example, the Christianisation of northern Europe was impacted strongly when Irish missionary Bonifatius destroyed a sacred oak of the Germanics in Kassel. Similarly, sacred places of the Incas and Aztecs were destroyed and turned into Christian churches, using the same building materials. Sacred shrines and groves in Africa were rejected and where possible demolished by the colonial occupants.

Meanwhile, the strategy of the colonisers also implied that traditional practices, which were not wholly in contradiction with the new religion, were given a new label, and gradually integrated into it. This syncretism can be observed in medieval Europe and Latin America, and to a lesser extent in Africa, where the church tolerates certain indigenous festivals and practices. In Latin America this syncretism is still very much part of the reality. For example, the Mayas in Guatemala and the Quechuas and Aymaras in the Andes have a wide range of traditional festivals and agricultural rituals, that are incorporated into expressions of Christianity. Hence, it could also be argued, that these peoples have absorbed Christianity into their traditional belief systems as a survival mechanism. In contrast, the traditional religious practices in Africa have been suppressed strongly by the formal churches, and syncretism is not as common and open as in Latin America.

Through education, welfare and technological innovations, the religion of the coloniser would gain popularity and over time create a new local elite educated in the new system. These new leaders had the tendency of rejecting the old religion even more vigorously than the missionaries before them, as their new position and status depended on it. The new elite was often trained by church-based institutions, as was the case in Africa, where the church-based education systems and development programmes often perform better than the state-based institutions. Even today, acknowledging the presence and relevance of indigenous knowledge and practices is often more difficult for the local elite than for outsiders.

Meanwhile, many traditional practices, leaders and institutions continued to function in parallel or secretly; the new religion and value system could not wipe out all traditions of the colonised population. Though often under threat, traditional leaders continued to perform their roles as spiritual leaders of the people in the local communities. This can still, and quite clearly, be observed in Latin America, Africa and Asia. Europe was no exception to this rule. But 700 years of domination by Christianity and the subsequent

social, economical and political developments, has reduced the original indigenous belief systems in to a vague memory for most Europeans.

Colonialism, western science and knowledge. The industrial revolution and the resulting economic development of Europe, as well as the spread of European trade and colonisation from the 16th century onwards, was the start of the inter-linked world economy. Innovations in maritime technology, as well as the feeling of superiority of the European people, enabled European ships to transport slaves from Africa to the Americas, to bring silver from the Americas, porcelain from China, and spices from the East Indies to the flourishing cities of western Europe. These processes culminated in European colonialism and imperialism of the 18th, 19th, and 20th centuries, which together with industrialisation, mark the birth of the modern world we know today [Scarre, 1991].

In the *Encyclopedia of the History of Science, Technology and Medicine in Non-Western cultures* [Selin, 1997], Micheal Adas presents an overview of the way in which western science played a role in European expansion, explaining how this has affected the diversity of knowledge systems in the dominated cultures. Adas asserts that, besides economic and religious expansion, scientific curiosity was one of the major motives for the European expeditions and conquests. Astronomers and cartographers often sailed with the merchants to test new instruments, take astronomical and nautical readings, and chart unknown regions. As European armies and administrators advanced inland in the Americas, Africa and Asia, geologists and botanists followed, and brought home specimens of exotic plants and minerals etc. The information gained was used to accumulate wealth in Europe and to build a new vision on the earth and the cosmos. Ethnological studies became the basis for allegedly scientific, and invariably hierarchic, classifications of human types, usually termed races. As western Europe's need for markets and raw materials grew, fields like meteorology, geology, chemistry and applied mathematics became important in the colonial enterprise.

With only a few exceptions, the European colonial scientists and policy makers were generally unreceptive to non-western ways of thinking and interacting with the natural world. They perceived western science as value neutral, objective in its procedures, privileging abstractions and reason, empirically grounded, transcending time and space, and therefore universally valid. These attributes gave the practitioners and scientists the confidence that the spread of this epistemology - and the institutions and procedures associated with it - to the rest of the peoples of the earth was both beneficial and inevitable. It was seen as a strategy to rationalise the world, and to banish superstitious, subjective, and intuitive epistemologies. Western science was as aggressively intolerant to non-western epreligions and sciences, as it had been to the culture of the original European peoples.

The process by which western science was diffused, and its impact on other societies, differed greatly. The Muslem leaders in the Middle East, for example, integrated western concepts in their knowledge, while the Chinese and Japanese resisted their introduction. This difusion process depended on various aspects, such as the timing of European interaction with the non-western culture, the colonisers' assumptions about the level of sophistication of indigenous technologies, as well as the actual attainments of the

colonised peoples in science and technologies. In India, China and the Middle East, the European colonisers recognised some aspects of the ancient civilisation - writing, the specialised intellectual elite, cities - which fed mutual curiosity and exchange. In China, the European Jesuits studied Chinese astronomy, chemistry and medical techniques, while the Portuguese and Dutch merchants in India consulted the local physicians, and accepted their superiority in treating tropical diseases.

Nonetheless, in all of the settlement colonies, indigenous systems for understanding, learning, teaching and experimenting were pushed to the periphery. Ethnologists studied indigenous belief systems for their antiquarian value, not because they had something to learn from it. The research agendas in the colonies were set by the scientific societies and institutions in Europe and served the needs of uncovering and extracting the great natural wealth. Meanwhile, racist assumptions about the mental capacity of the indigenous peoples ensured that little or no training in science was made available. Though in India surveyors, engineers and medical practitioners received training and worked for colonial administrations or firms, in much of the rest of Asia, sub-Saharan Africa, Latin America and the Pacific islands, the opportunities for advanced training were minimal. In these areas, scientific work was the monopoly of the European coloniser. This left most colonised peoples ill-prepared for the post-colonial world, where the western concepts of science, law, nation building and administration were dominant. This has limited their capacity in economic competition, development planning and intellectual discourse [Adas, 1997].

Several other authors have also studied the impact of colonialism on indigenous peoples. Ubiratan d'Ambrosio [1997], for example, refers to the exploitation of lands, resources and peoples of the American colonies. "*The conquerors had no concepts to explain and understand what they observed in the newly found lands. They marvelled at the construction, urban organisation, clothing and ornamentation of these peoples. The colonisers brought with them traditional European agricultural and mining techniques. The means of production were changed, native religions destroyed and food habits modified. Latin America was the recipient and not the producer of scientific advances. Also after independence, the peripheral position of the countries was maintained. The colonial style and submission of the native population was continued and education was modelled on the former imperial system*". Gloria Emeagwali[1997] states: "*Colonialism has weakened the African capacity in experimentation, problem solving and the creation of utilitarian objects and processes. It has left an educational system more geared to the reproduction of Christian values and alienation, than the further development of the African scientific and technological capacity*".

The impact of colonisation, did not end when the independent nation states were contributed. For example, scientific thinking in present day India has absorbed the western concept of man's control over nature [Guha, 1994]. The roots of this phenomenon do not only lie in the Judeo-Christian ethics of the colonisers, but also in the process of gaining independence from the British in 1947. The post-independence process of development considered it a national challenge to reduce the gap between independent India and the industrialised countries. Rapid industrialisation was conceived as the basis of this development, as well as the technical and social sciences related to it. These western based sciences and concepts replaced the Indian scientific traditions to a considerable extent.

Postmodernity

The scientific paradigm that emerged during the Enlightenment is still equalled by many to 'modern'. The impact of the technologies developed by this approach has been tremendous, and has ensured food security and accumulation of wealth in various parts of the world. At the same time the limitations of this materialistic-mechanistic worldview are now clearly visible, such as the increasing poor-rich divide, environmental pollution, loss of biodiversity, and the break down of social structures in rural areas throughout the world. There is a growing need for more sustainable food production systems and economies, which calls for a new approach.

In the early 20th century Einstein formulated his laws of thermodynamics and the theory of relativity, thereby laying the foundation of new physics and of post-modernity. Development in quantum mechanics, pioneered by Niels Bohr and Werner Heisenberg, further modified the hitherto conventional concepts of time and space, matter, gravity and cause-effect relationship. They concluded that subatomic particles have a dual nature: depending on how we look at them they can appear as particles (matter), or as waves (energy). Bohr, therefore, considered the particle and the wave as complementary descriptions of the same reality. Heisenberg postulated the 'uncertainty principle', which is based on the finding that at subatomic level matter does not exist with certainty at definite places, but rather shows tendencies to exist, and atomic events show tendencies to occur. In contrast to the former mechanistic Cartesian worldview, this post-modern worldview can be characterised as holistic: the universe is no longer seen as a machine, made up of a multitude of objects that can be controlled, but as one indivisible, dynamic whole whose parts are interrelated.

In the 1980s the General Systems Theory emerged, in which an organic, living system is not considered a machine that can be managed and controlled once its dynamics are known, but rather a combination of living, interacting and self-organising elements. Competition, symbiosis, self-renewal and innovative creativity are important processes in a living system [Röling, 1992]. Chaos can be a necessary step in the evolution of a system towards a new order of higher complexity and quality [Prigogini, 1984]. The notion of Gaia [Lovelock, 1979] assumes that earth behaves like a living organism, and her properties and processes cannot be understood and predicted from the mere sum of its parts. In this notion, the reductionist description of organisms can be useful and necessary, but is considered dangerous when taken as the complete explanation of reality. Reductionism and holism, analysis and synthesis, are seen as complementary approaches, which, if used in a proper balance, help us to gain a deeper understanding of life [Capra, 1983]. Ruppert Sheldrake [1994] has elaborated the theory of morphogenetic fields and resonance. Other authors, like Ken Wilber [1998], are elaborating holistic theories to link science and spirituality.

This is combined with an increased interest and influence of the scientific concepts of eastern knowledges. For example, Capra [1983] points at the relationship between the Systems Theory and Taoism, and concludes that the dualism observed at sub-atomic level, coincides with the Taoist concept of Yin Yang duality. Others look at eastern sciences based on completely different concepts, to find ways of complementing western science.

For example, they look at Ayurvedic medicine, in which completely different categories are used and the analytical methods are not limited to the five senses (smell, taste, hearing, touch and sight). Instead, complete awareness is sought at a level of perception, by which the observer both reaches out and looks within, establishing a subjective flow between the observer and the observed.

The boundaries and potential of post-modern science are difficult to indicate. New paradigms are sometimes difficult to defend, prove or explain in the conventional paradigm; some may be speculative and many meet with resistance. Yet, post-modern science presents an interesting panorama of diverse approaches, perspectives and theories. Moreover, western science is increasingly interested in understanding the human condition with an emphasis on the local. In fields as varied as physics, ecology, history, feminist theory, literature, anthropology, economy and politics, more attention is paid to understanding the specific characteristics of each locality. Yet, in the vast majority of centres of formal education, both in the North and the South, positivist thinking and materialistic values are still dominant.

Globalisation

Global co-operation, exchange and conflicts between groups and nations have existed since the emergence of the first urban centres in Mesopotamia some 5,500 years ago. The industrial revolution and colonial system in the 16th and 17th century led to the first worldwide trade and communication system. Though the colonial system formally came to an end by the second part of the 20th century, the economic relationships between the new nation states and their former colonisers did not become equitable. Transnational enterprises did little to invest in the South, while export subsidies and import levies prevented access of tropical countries to the northern markets. Later on, development co-operation became the responsibility of the governments of the rich countries, but without a radical change in trade relations, was insufficient to alleviate poverty, or to help stimulate local economies.

Meanwhile, ongoing technological and commercial developments increased the incorporation of regional and local economics, as well as communication, into the global systems. Especially the innovations in transport and telecommunication have allowed a multiple exchange of ideas and goods: the global market has penetrated all parts of the globe. This contemporary process of increased global communication, application of internationally accepted technologies, and the uniformity of commercial products and values, is now commonly understood as 'globalisation'.

Globalisation offers opportunities to link people across the globe, to exchange information and goods. It provides the opportunity to link production systems in a complementary way and allows production to take place in those areas with a comparative advantage. In the present global information system, people can inform and learn from each other, assist each other in decision-making, or join forces in negotiation and lobbying. Globalisation contributes to fast and intensive communication and greater knowledge about different societies, cultures and ecosystems in the world. It also contributes to an increased awareness of the fragility of the earth's ecosystem, and the recognition that

indigenous knowledge and traditional cultures may contain key characteristics for meeting the global challenge of re-establishing biological and cultural sustainability. The present-day trends aimed at diversification of biological and socio-economic systems, and at revitalisation of local cultures, can be understood as an effect of globalisation.

Globalisation and poverty. Though globalisation has contributed to overall economic growth, this growth is clearly not found everywhere on the globe, and certainly not all social categories have benefited from it. Many are forced to migrate whilst numerous traditional life forms are driven into the background. Almost half of the world's 6 billion people live on less than US\$ 1 per day. Poverty can be expressed in the increased lack of purchasing power, political power, ill health, high child death ratio, low education, economic dislocation, personal violence, political extremism and poor resilience to natural disasters in large parts of the world.

Economic growth demands space, energy and resources, and puts stress on the global climate, waters, biodiversity and vegetation. The resulting and ongoing erosion of natural and biological resources is accompanied by diminishing cultural diversity. Many traditional societies break up and numerous customs, cultural expressions and languages are vanishing. More than half of the 6,000 languages currently spoken is unlikely to survive the 21st century. Global awareness of these problems, and recognition of these by governments, have led to a considerable number of international conventions and initiatives on biodiversity, desertification, water and climate change.

But, despite efforts to liberalise world trade, international trade relations are still far from equal. Export subsidies and import levies are still imposed on the poorer countries by the major economic blocs in the North. One cannot speak of equal chances for most tropical countries in accessing the global economy. Integration of the poorer countries into the global market often implies the supply of low income jobs to foreign companies and the specialisation in bulk production of raw materials. This produce is then exported to the rich countries, where the processing and commercialisation take place, and where most of the benefits in terms of added value remain. Besides social and economic injustice, this process also implies massive international transport, high energy costs and health risks.

Another effect of globalisation is that rural communities experience a change in their local markets. Under the influence of mass media and education, a general westernisation of taste and consumption patterns is taking place. Urban consumers in developing countries increasingly consume western (fast) food and drinks more than their traditional products. At the same time, local producers find it difficult to access national consumer (super)-markets due to different quality standards and supply systems. Similar processes are taking place in relation to traditional dress, crafts and architecture, as well as traditional human and animal health practices. The economic opportunities for these local products are increasingly being taken over by the international markets, resulting in further poverty as well as loss of traditional skills and experience. In the process traditional leadership is losing its impact on local management of natural resources, leading to further deterioration of the local eco-systems and the income that can be derived from them.

The spread of global science. Present day scientific concepts and approaches are no longer specific to a certain region. Today, global knowledge and science is the result of global processes of knowledge generation, application and technology development. It is the product of regional specialisation, and global integration of communication, production and trade. Scientists from all over the world communicate, co-operate and exchange concepts, theories and research results. Whether based in Europe, USA, Japan, India or any other country in the South, East or West, the concepts, approaches and contributions can be chosen depending on the particular expertise and price of the researcher.

At the same time, access and contribution to this global knowledge is not spread equally over the globe; it is dominated by western-based organisations whose research and development activities are financed by trans-national commercial enterprises. Although virtually all countries in the South have established institutions of academic education and research, they differ greatly in sophistication and effectiveness. In many cases, university education and research are based on western scientific standards, rather than on their own scientific traditions, local resources and knowledge systems. Curricula and research protocols are often poorly adjusted to the needs and possibilities of the local people and their knowledge systems. As a result research and development activities have the tendency to enhance technologies for international systems, rather than to support the technological, economic or cultural needs of the specific region. In general, low literacy rates, colonial history, economic status, national budgeting and planning, and political instability contribute to the problem. The processes of privatisation and liberalisation have put health services and agricultural inputs beyond the reach of many rural people.

The outcome of these processes is that those sections of the population that want to develop their local economy and cultural identity find it increasingly difficult to achieve their goals. This lack of development options in the rural areas has led to an increase in rural poverty, and migration in search of greener pastures. Internationally, the large numbers of political and economic refugees put pressure on the western states for accommodation, education, employment and safety. Policies to control the number of asylum seekers and multi-culturalism are hot political issues in most of the western countries today.

Reactions to dominance. When faced with pressures from a dominant foreign society and its culture, people respond in a variety of ways, varying from total acceptance to total rejection, with partial acceptance and a combination with their own traditions in between. Each of these positions can be expressed in a different way: silently or vocally, collectively or individually. Often the rejection of the dominant culture takes place in a hidden or secret way. Therefore, in most traditional societies that are dominated by a foreign culture one can observe underground systems of traditional value systems and leadership, which guide the decisions of rural people. Representatives of the dominant system, however, are often inclined to believe that these traditional values and practices largely belong to the past.

Meanwhile, traditional societies are not uniform. Often there is a communication gap, or marked difference of opinion, about the best way forward. This is often the case between generations, and between family members with formal or informal education: the younger and the (formally) educated people are often inclined towards the western-based

knowledge system. This contradiction can also be observed between local and formal governance and jurisdiction systems. Sometimes the acceptance of the dominant system is based on the conviction that it will bring a genuine improvement, a liberation from the negative aspects or 'ties' of tradition.

The problems associated with the introduction of modern, or Green Revolution agriculture, such as declining soil fertility, health hazards, declining producer prices, increasing input prices, and reduced income, may explain the increasing tendency to revive traditional knowledge and practices. Revivalism may be expressed as a genuine belief that parts of the past may be important to develop the cultural identity and local economy, possibly in combination with certain elements and practices from other origins. But, revivalist tendencies can also take other shapes: it can become a fundamentalist reaction, which reduces the capacity to look for improvements of local practices, and to adjust to changing circumstances.

The position of Compas presented in this book is the acceptance of the existing diversity of cultures as a fact that offers a wide range of opportunities. Intercultural contacts can lead to dominance, control and disappearance of cultures, but, if these contacts are managed in a different way, they can also lead to productive and respectful learning. In the process of enhancing endogenous development, respect for differences in cultural values and concepts is a precondition. But, respect does not imply the unconditional acceptance of all differences. Instead, it implies the willingness to listen, openness to learn and be responsive, and the capacity to criticise, respectfully, when necessary [Fay, 1996].

Relating the local and the global. Western science has succeeded in transforming the world and livelihood systems in a way that no other system has so far. The success of western science is embedded in its ability to move and apply the knowledge it produces beyond the site of its production. However, at the end of the 20th century the high cost of such a scientific hegemony was observed - especially in terms of increasing environmental degradation and ethnocide. Turnbull [1997] states, for example: "*Without the awareness about local differences, we will lose the diversity and particularity of the things themselves. We need a new understanding about the dialectical tension between the local and the global. We need to develop forms of understanding, in which the local, the particular, the specific and the individual are not homogenised, but are listened to and enabled to talk back.*"

Speaking about indigenous knowledge, practices and leadership does not assume that all is positive. As with other knowledge systems, indigenous knowledge of different cultural backgrounds does not have all the answers to the present day problems, and certainly has its limitations. Its adaptability to present needs may be limited, while it is often not uniformly distributed in the communities. The access to specialised knowledge may be limited to certain persons, who may not always use it to the benefit of the community. Differences in power structures, access to land, knowledge and medicine may be very difficult for certain classes, or castes. Many traditional systems are dominated by male leaders and the position of women is marginal, while some traditional practices justify the exploitation and abuse of women.

Over the past decade a renewed interest in the technical aspects of traditional knowledge and practices in agriculture and health has emerged. Many indigenous techniques on

a variety of subjects, such as soil and water conservation, natural pesticides, inter-cropping, agro-forestry, food processing, as well as ethno-veterinary and human health practices, have been documented and can be improved successfully [Reijntjes et al., 1994]. A number of such documented indigenous practices, especially related to the use of medicinal herbs, are now available in computerised databases, readily accessible to governments and scientific communities. Though this so-called *ex situ* conservation approach has an important function in demonstrating the relevance of indigenous knowledge, it also carries the risk of extracting the knowledge from local communities. The data can easily be used for the benefit of outsiders, who may even patent it. Moreover, the focus is often limited to the biophysical side of indigenous knowledge, while the way local people interpret the world, their traditional leaders and spiritual practices, as well as their ways of learning, teaching and experimenting are often not considered. The endogenous development approach, on the contrary, implies the so-called *in situ* conservation and development of indigenous knowledge (see chapter 3).

Meanwhile, an increasing number of universities and development agencies, such as the World Bank, UNESCO, IFAD and FAO, now have programmes that focus on indigenous knowledge. Also United Nations conventions, such as UNCBD and UNCCD, acknowledge the importance of indigenous knowledge and practices in their declarations. A recent publication of UNDP specifically addresses the need for integrating local and global knowledge as one of the challenges for technical co-operation [Fukuka-Parr et al., 2002].

Towards a co-evolution of cultures

Therefore, there is an urgent need for new initiatives and paradigms of development with a balanced view on traditional sciences, technologies and knowledge systems. While modern science and technology are spreading, the vast majority of the people in the world still survive on the material and intellectual sustenance from their own indigenous traditions. These practices have their potentials as well as their limitations, but few efforts are undertaken to test and improve them on basis of the worldview of the people involved. We need to thoroughly re-evaluate the indigenous traditions of science and technology, free from the prejudices and preconceptions of the western scientific outlook.

This chapter has shown a great diversity of knowledge systems that co-exist and co-evolve, that influence, absorb or neglect each other. While the interest in non-western knowledge, and the call for synthesis between global and local knowledge is increasing, a number of agencies are emphasising the importance of endogenous development. This is a development based mainly, but not exclusively on locally available resources, such as land, water, vegetation, local knowledge, as well as the values and preferences of the local people. Supporting endogenous development does not imply a narrowly defined development approach, nor does it romanticise or reject traditions. Endogenous development is an approach that takes place complementary to the ongoing global processes, and can thus be seen as an effort to bring together global and local knowledges.

The next chapters present the Compas programme, and elaborate on the characteristics and methodologies for endogenous development, as developed by the Compas part-

ners. Chapters 4, 5, 6 and 7 present an overview of the worldviews in Asia (with a focus on the Indian sub-continent), Sub-Saharan Africa, Latin America and Europe, as well as case studies of the Compas partner organisations in these areas. An analysis of the results of these efforts and ways for creating an enabling environment for endogenous development are presented in the concluding chapters.



Participants Compas International Workshop (2001). **Kneeling, left to right:** Selvaraj *India*, David Nkanda *Uganda*, Marthen Duan *Indonesia*, Nestor Chambi *Peru*, Krishna Prasad *India*. **First row, left to right:** K. Vijayalakshmi *India*, H. Saraswathy *India*, T.S. Suma *India*, Manasi *India*, Katrien van 't Hooft *the Netherlands*, Vanaja Ramprasad *India*, A.V. Balasubramanian *India*, G. Bhupathy *India*, Felipe Gomez *Guatemala*, Damodaran *India*, S. Arumuga Swamy *India*. **Second row, left to right:** Nirmala Arunkumar *India*, Sophia Solomon *India*, Dora Ponce *Bolivia*, Yovita Meta *Indonesia*, Maragarita Correa *India*, Nanditha Ram *India*, C.B. Shrivatsa *India*, Jaime Soto *Chile*, Freddy Delgado *Bolivia*, Batuuka Samuel *Uganda*, O.T. Kibwana *Tanzania*, Upendra Shenoy *India*, Maheswar Ghimire *Nepal*, Arjuna de Zoysa *Sri Lanka*, David Millar *Ghana*, G.K. Upawansa *Sri Lanka*, Tirupati Rao *India*. **Third row, left to right:** Thambi Durai *India*, James Handawela *Sri Lanka*, Bomber Mamba *Swaziland*, Aruna Kumara *India*, Wim Hiemstra *the Netherlands*, Prashanth Varma *India*, Darshan Shankar *India*, A.S. Ananda *India*, K.A.J. Kahandawa *Sri Lanka*, Cosmas Gonese *Zimbabwe*, Bertus Haverkort *the Netherlands*, Coen Reijntjes *the Netherlands*, P.M. Unnikrishnan *India*, Abdul Hafeel *India*.