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Environmental Ethics

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The societal roots of the environmental discussion are discussed. Attention focusses on the roles played by the nature conservation, environmental, consumer and anti-nuclear movements, popular and popularized science, the media and the development of environmental policy and regulation.
The scientific approach and the societal background enable us to understand the concept of the "environmental crisis", which itself provides the most important contextual background to environmental ethics. To illustrate contemporary thinking, an analysis of Agenda 21 shows how environmental problems are currently seen as the result of poverty, consumption and production patterns and demographic and decision making issues.
Using this environmental knowledge background as a reference, the main lines of thinking in environmental ethics are overviewed. The overview begins by looking at approaches which value the environment because it is or might be of value to man. It continues by considering approaches which are intermediate between the anthropocentric and deep ecological viewpoints. In particular, Leopold's"Land Ethic" and Singer's"Animal Liberation" ideas are discussed.
Deep ecology is based on the idea that nature as a whole has moral value. Reference is made to the work of the Norwegian philosopher Naess and to the more scientifically-rooted "deep green theory" of Sylvan and Plumwood.
In addition to these different lines of theorising within environmental ethics, the ethical aspects of such anchorpoints in the environmental discussion as sustainable development and the Gaia theory, are also discussed.

Keywords: Environmental, ethics, ecophilosophy, deepecology

1. Introduction

Confronted by public and scientific perception of the "environmental crisis", there is fairly general agreement among environmental philosophers that the environment should be looked at from an ethical perspective. Environmental philosophers agree that environmental matters are important and have not received adequate attention in the past. They believe that ethics should play a larger role in the way we handle environmental problems. They disagree, however, about what exactly constitutes an environmental ethic, how it is achievable, and to what degree it is desirable to achieve it.
This paper overviews key issues in environmental ethics today. Environmental values and actions are greatly influenced by the way we perceive and understand the environment. This paper starts by describing how scientific insight into environmental matters has changed during the last century. Besides scientific evolution, our perception of the environment is thoroughly influenced by the actors in the environmental discussion and the issues which they address. These elements (scientific understanding, actors and issues) provide the context to the discussion of current trends in environmental ethics.
These trends are described in the core part of this paper where particular attention is given

to the more influential theories, such as deep ecology. The ethical dimensions of sustainable development and the Gaia theory are also addressed.
Action and concern about environmental problems should be targeted towards the solution of these problems. The last part of this paper looks at environmental policy issues where the ethical component is changing the direction of the discussion. The recombinant DNA discussion is particularly interesting in this respect, as are the pesticide and food additives discussions. The ethical elements in environmental standard establishment and maintenance are also discussed.
Finally the paper tries to detect future trends in the influence of ethics on the environmental discussion.

2. Environment as an ethical element

2.1.Evolution of environmental problems

The way we look at environmental problems has been influenced by developments in science and by the changing way society treats environmental issues.

2.1.1. Ecology and environmental science

Environmental science is related to ecology. Ecology originated as a part of plant biology during the 19th century, a series of papers were published which dealt with concepts, ideas and techniques of analysis, which we would now consider as being part of ecology. Another landmark in the progress of knowledge was set by Charles Darwin. He identified the environment as a force shaping plant and animal physiology and behavior, and postulated the theory of competition among animals as a mechanism for enhancing species survivability. The most frequently cited definition of ecology also stems from this period and it is ascribed to Haeckel, who in 1866 during his inaugural speech as professor of Botany at the University of Jena in Germany, defined ecology as "the study of the reciprocal relations between living organisms and their biotic and abiotic environment".
From a scientific point of view, it is remarkable that these developments originated independently from one another. The synthesis came by the turn of the century, predominantly through the work of Warming, "Plantesamfund" (1898), which not only reported on the data of the dunes around Copenhagen, but also provided a conceptual framework to situate the findings of the previous century. "Plantesamfund" is therefore often considered as the first ecological textbook. For biology, this new ecological approach meant that one progressed from studies on a single-species basis to the recognition of plant and animal interactions and interdependencies. The associated evolution theory enabled scientists to understand evolution in a timeframe of millions of years, and allowed them to form basic theories postulating a direct connection between humans and other life forms. Mythological and religious explanations for human existence became obsolete. This change of perspective proved to be very significant in the 20th century.
The 20th century started with a "period of foundation" (1902-1910) during which the ideas of the botanists were applied firstly by the zoologists and subsequently by other scientific disciplines, such as archeology and sociology. The principal ecological societies, such as the British Ecological Society (1913) and the Ecological Society of America (1916), were also created at this time.
The approach of the biologists was also of inspirational value to scientists in other disciplines. In the 1920s, R.E. Parks and E.W. Burgess (1925) applied the ecological

theory to cities, using it to analyze and describe them in terms of interactions between society and its physical and sociological urban environment. They described Chicago in terms of townships and laid the basis for the development of the Chicago school. The ecological approach thus also emerged in geography, cultural anthropology and psychology (for an overview, see e.g. Borden 1991).

Theories advance science, but until the late 1930s the ecological discussion was largely limited to intellectual debate within universities. By that time for example, pesticides and fertilizers had become inexpensive and available in sufficient quantities to boost agricultural production throughout the industrialized countries. Moreover, ecological knowledge was successfully used to combat malaria in Northern Italy and around Rome. Although the first indications of man made environmental disasters -e.g. massive floods and the dust bowl in the US- were also appearing at that time, general public perception about the new possibilities opened up by ecological knowledge was very positive and promising.

This explains why both politicians and the general public turned to the ecologists in December 1952, to deal with the "London Smog" problem that caused over 4000 deaths. The smog had and had become the first recognized major human health disaster caused by pollution. Although ecology could have been a useful tool to analyze and solve the pollution problem, the answer provided by the ecologists was incomplete. It became clear that only a concerted action amongst scientists, engineers, medical professionals and lawyers could provide the background necessary to push through the Clean Air Act, which was passed four years later. This interdisciplinary cooperation has become a characteristic of environmental science, as it has developed over the past four decades.

2.1.2. Societal roots

Although it is easy to show that societal factors have substantially contributed to environmental problems and to the perception of them, it is much more difficult to list them in a systematic way. The following is an attempt to show that the social impact is as important as the "autonomous" scientific development.

Nature conservation movement: the exact origin of the nature conservation movement is unclear. There is no doubt that for example, by the middle of the 19th century, romantic painters in Paris organized actions to save parts of the forest of Fontainebleau. Such actions were however patchy, unstructured and rather occasional. More structured and permanent active groups, such as the Nature Trust in Great Britain and the Sierra Club in the United States, were established by the end of the last century. They are important to this debate for a variety of reasons:

- they promote the idea of nature as a value not only because it is important to man, but because of its own intrinsic qualities,
- both their organizational structure and the instruments they use to reach their targets (e.g. ownership of terrains with ecological value) have been inspirational for nature conservation groups worldwide.

Consumer movement: the consumer movement is a product of the American consumption society of the 1920s. It began with the main aim of objectively informing consumers on the "best buy" of a particular product or service using technical-scientific evidence. This informative, defensive attitude was substantially modulated and complemented during the 1950s when Ralph Nader became president of the American Consumers Association. This lawyer from New York began to use more offensive and preventive approaches in the consumers-producers debate. His best known case was the "Corvair" model of General Motors, a car Nader called "unsafe at any speed". He brought the case before court, and succeeded in banning the car from the market.

The court actions of Nader provided the consumer movement with an important internal momentum and elan. Press attention made the actions known worldwide and, by the second half of the 1950s, consumer groups had been set up in many industrial countries (e.g. Belgium 1957; France 1958). The inspirational impact Nader's methods had on the environmentalists and the environmental movement are equally important to the environmental discussion.

Anti-nuclear movement: the production of eventual use of atomic bombs in Hiroshima and Nagasaki (6th and 9th August, 1945), of hydrogen bombs by the U.S. and Russia (1st November 1952; 12th August 1953) and the resulting nuclear arms race have had at least two major consequences on the ethical dimension of the environmental debate:

- these weapons were the result of the work of excellent scientists, dealing, at least initially, with purely scientific questions: splitting nuclei and nuclear chain reactions. It was only the subsequent phase of ethical-political considerations that pushed them to develop the bomb. As soon as this had happened, however, they found that they had lost control of the result. The development of the nuclear bomb is a dramatic demonstration of the fact that science is not value-free. This explains why, for example, such eminent scientists as Einstein, warned President Rooseveld not to use the bomb. Scientific opposition against the use of nuclear technology is as old as the technology itself and has continued ever since.

The dramatic situation in Hiroshima and Nagasaki also showed that man had crossed a frontier of technological development which should never have been crossed.

Medical doctors were concerned about the effect the "Cold War" situation was having on the superpowers and their allies. The renewal of arsenal weapons, that already existed in numbers capable of destroying the planet more than once, had absorbed enormous amounts of money which might have been used on health expenditure. Moreover, underground nuclear testing continously contaminated and interfered with the environment.

In the 1980s, a group of medical doctors who were eminent and successful in their profession and hoped to influence their decision making patients, founded a medical association called International Physicians for the Prevention of Nuclear War (IPPNW). This association was awarded the Nobel peace prize in 1985.

More recently the "Doctors for the Environment" were established. This is a society which focuses on environmental health problems.

Popular and popularized science: environmental consciousness also gained momentum with the publication of a number of books which were accessible to a broad audience and pointed to different aspects of the environmental debate. In 1962, the American biologist Rachel Carson published "Silent Spring". This book describes the slow but absolute poisoning of the environment by pesticides and DDT in particular.

In 1968, "The Population Bomb" (Paul Ehrlich) warned of unavoidable disaster if population growth was not brought under control. The book was updated and revised in 1991 and published as the "Population Explosion" (Ehrlich and Ehrlich). It links demographic issues to those of global warming, rain forest destruction, famine, air and water pollution. It explains why overpopulation can be regarded as the number one environmental problem.

The first report of the Club of Rome was published in 1972. "Limits to Growth" described the consequences of the natural resource depletion which could be expected in an economic and demographic "business as usual" scenario. It focussed on the limited nature of natural resources. The researchers of the Sloan School of Management in the Massachusetts Institute of Technology (MIT) updated their results in 1991 (Meadows et al.). Many people considered the reports of the Club of Rome as overly pessimistic

predictions of catastrophies which had not yet occured. However those who have read these reports know that the core message is essentially a constructive one: it is possible to build a situation of environmental and economical equilibrium, if we can transcend the myopic focus on economic growth and material welfare prevalent today.

The Environmental Movement: consists of the nature conservation movement complemented more recently by a wide array of organizations involved in environmental hygiene issues. They are structured internationally (Greenpeace, Friends of the Earth, etc.), nationally, regionally and locally. They cover a broad spectrum of issues ranging from global changes to indoor pollution.

The environmental movement is one of the leading actors in shaping public perception about environmental problems. Research has shown that in environmental matters the public opinion trusts environmental groups more than any other actors in the field, including scientists and authorities.

Media have influenced public opinion in at least two ways. Since the London Smog (1952) there has been a long series of environmental accidents and disasters which the media have reported. A selected series includes the mercury poisoning in the Bay of Minamata, Japan (1959, 1965); the oil poisoning by the Torrey Canyon (1967) and the Amoco Cadiz (1978) oil spill off the coast of Britanny, France; the dioxine pollution by Hofman - La Roche in Seveso, Italy (1976); the methylisocyanate release from the Monsanto plant in Bhopal, India (1984); the Bayer (1986) and Sandoz pollution of the Rhine; the near nuclear accident at Three Mile Island in Harrisburg, US (1979); the almost continuous leakages at the nuclear facility of Windscale (now Sellafield) in Great Britain (since 1983); and the nuclear disaster of Chernobyl, Ukraine (1986).

During the 1950s and 1960s, environment was only interesting when accidents occured. From the 1970s on, most newspapers and journals have reported on the environment on a systematic, day-by-day basis in a manner increasingly comparable to that in which they handle social and economic issues.

Development of environmental policy and regulation: although it is possible to find regulations by authorities for environmental problems throughout human history, contemporary environmental legislation took off after establishing the British Clean Air Act (1957), which served as a model for air pollution control laws on the continent and overseas. They were followed by framework laws on water and later on soil. Although these framework laws had clear potential to improve environmental quality, their implementation was very ad hoc. As a consequence, a large set of complementary legal measures targeted towards sectors (industry, agriculture, tourism, etc.), environmental problems (acidification, nitrification, gravel or sand winning, etc.) and ecosystems (protection of coastal areas, dunes, landscapes, forests, nature reserves, etc.), were also instituted. These have been followed by the steadily growing and equally legal arsenal of specific instruments, such as environmental impact assessments, standards, environmental planning, state of the environment studies, environmental care systems, etc... (For an overview of environmental legislation in the E.U., see e.g. Debeukelaere and Cashman, 1997 and in the U.S., Luneburg, 1997).

Developments in individual national states have been complemented by developments in international environmental diplomacy.

Main developments in international environmental regimes entail:

- the Montreal-London-Vienna protocols on the phase out of some ozone depleting substances,
- the whale-protection regime,
- the trade in ivory from African elephants and the related Convention on International Trade in Endangered Species (CITES),

- the international toxic waste trade under the Basel Convention on Control of Transboundary Movements of Hazardous Waste and their Disposal,
- the Convention on the Regulation of Antartic Mineral Resources Activities (CRAMRA) which is an important basis for the protection of the Antartic environment,
- the Framework Convention on Climate Change to start acting on global warming,
- the Convention on Biological Diversity aiming at counteracting biodiversity loss, which has been widely recognized as one of the most serious environmental threats,
- the Desertification Convention.

These developments in environmental legislation and policy have brought citizens into regular contact with environmental problems and effected the public's perception of environmental problems.

2.2. The "environmental crisis" concept

An important driving force behind the action pattern of these different target groups is the concept of the "environmental crisis". The crisis idea is often associated with acute accidents. No doubt the radioactive disaster of Chernobyl, the Exxon Valdez oil spill, etc... greatly contributed to act perception of the environment as acutely endangered. But perhaps more important are those types of environmental degradation which are proceeding slowly and producing gradual effects. Many indicators are bad and most of them are getting worse. By way of illustration, consider the following daily changes:

- 44.8 km^2 of rainforest destroyed,
- 27.8 km^2 of land lost to encroaching deserts,
- 40 to 100 species made extinct,
- human population increase by a quarter of a million,
- 15 million tons of carbon dioxide added to the atmosphere.

There are undoubtedly objective indicators of the environmental crisis, and many authors consider the negation of these facts as one of the most dangerous aspects of the crisis. However, crisis claims, such as the following, generate enormous controversy, particularly from industries and their advocates in science and policy.

2.3.Fundamental aspects of environmental problems: the "environmental crisis" concept revised

Although the environmental crisis concept of today deals with recent developments and theories, the original concept dates back to the 1970s. At that time, there was still a widespread belief that environmental problems were the (unwanted but unavoidable) side effects of scientific and technological progress. It was understood that environmental problems could be solved by technological adjustments, new legal constraints, vigorous public protest, and a return to fundamental humanistic moral principles. Difficult as it has been to try all of these things, and to succeed at even some of them, it has now become clear that they are not nearly enough.

This is because the environmental discussion has broadened in several ways. The first change, has been one of scale. Environmental problems originally involved issues localized very close to the living environment of people. Since the 1970s, environmental problems were discovered on greater geographic scales. Stratospheric ozone depletion and climate changes are worldwide problems both in their causes and their effects. A wide range of problems exist on a range of geographical scales: from local, through regional, fluvial and continental, to global. It is important to realise that the relationship between the intrinsic properties of an environmental problem and the mechanisms for dealing with the

problems vary according the scale. For example, the larger the scale of a problem, the greater the "buffering capacity" of the system and the longer it takes before consequences become obvious. Also, the larger the scale, the more difficult it is to handle the problem and the more complex management decision making becomes. As more and more meteorologists refer to the global changes, the question has now been put foreward on an ethical level as to whether we have the right to experiment with the globe.

The second way the environmental discussion broadened concerns scope. During the 1980s, particularly, it became obvious that environmental problems were more related to society and societal metabolism than a scientific-technical outlook alone could reveal. The report of the U.N. World Commission on Environment and Development (1987) on which we comment in more detail in section 3.7., was an important landmark in this discussion. At this stage, it is sufficient to state that the report analyzed the relationships between environmental degradation and economy on a worldwide scale. A second, more in depth analysis was offered by Agenda 21, the main product of the UNCED conference of 1992. Agenda 21 provides a basic framework and set of instruments to help guide the world community in taking decisions on the goals, targets, priorities, allocation of responsibilities and resources associated with the environmental and development issues the world currently faces. In its first section, Agenda 21 analyzes the social and economic dimensions of contemporary environmental problems as follows:

Combating poverty: Many of the world's environmental problems can be traced to the poor-rich duality. On the one hand there are the activities of the very poor -approximately one billion people surviving on less than $1 a day- who are driven to destroy the environment because very often they have no other possibilities. It is a question of sheer survival. The only hope is to improve their lot substantially. On the other hand, at the other end of the scale there is the 1 billion rich people, consuming between 80 and 85% of the world's resources. They have to change their lifestyles, scale down their patterns of consumption and the voracious demands thereby placed on the world's resources. In doing so, they would not only be responding to a moral imperative; they would be creating room for other, less affluent nations to expand and grow.

Changing production and consumption patterns: especially the need to change unsustainable patterns of production and consumption (not only in the North, but also for the rich in poor countries), that lead to environmental degradation, aggravation of poverty and imbalances in the development of countries.

Demographic dynamics: Making clear the relationship between demography and environmental quality was one of the challenges facing those involved with the preparation of Rio. One can summarize the underlying philosophy by quoting Britain's Prince Charles when he addressed the Reconvened Meeting of the World Commission on Environment and Development on April 22, 1992, less than two months before the UNCED conference took off: "I do not want to add to the controversy over cause and effect with respect to the Third World's problems. Suffice it to say that I do not, in all logic, see how any society can expect to improve its lot when population growth regularly exceeds economic growth. The factors which will reduce population growth are, by now, easily identified: a standard of health care that makes family planning viable, increased female literacy, reduced infant mortality and access to clean water. Achieving them, of course, is more difficult but perhaps two simple truths need to be addressed at every international gathering about the environment: we will not slow down birth rate until we address poverty. And we will not protect the environment until we address the issue of poverty and population growth in the same breath."

Environment and health: Agenda 21 identifies two main dimensions to the environment and health issue. On the one hand, there are the (increasing) health risks related to exposure to contaminated water, air, soil and food. On the other hand, for the vast majority of the world's population, there is the challenge of meeting basic standards of environmental health. There will be no real improvement in the environment as these people experience it on a daily basis unless these standards are met.
Human settlement: In the mid 1870s only 3% of the world's inhabitants lived in urban areas. By 1950, urban areas accounted for nearly 29% of the population. By 2025, 60% of the world's anticipated 8.5 billion people are expected to be living in and around cities. Agenda 21 addresses the need to promote sustainable development in the cities of the industrialized countries, which are currently causing severe stress on the global ecosystem, and in settlements in developing countries, where more raw material, energy and economic development are required in order to overcome basic economic and social problems.
Decision making: Agenda 21 argues for the integration of environmental factors into decision making in all sectors and at all levels, but in particular with regards to social and economic aspects. Environmental factors should also be integrated into the law, economic instruments and national accounting.
The analysis made in Agenda 21 is not unique, nor is it the only analysis possible. However, it clearly shows that the environmental discussion has moved far beyond a purely scientific-technical approach. Opting for the environment increasingly means opting for a socio-economic organization which is framed by environmental constraints. As such, the environmental crisis not only has an environmental quality component, but also has a social and economic dimension which is set within a global and transgenerational frame of reference.

3. Elements of ecophilosophy

3.1.Definitions: ecophilosophy, ecosophy, environmental ethics

An ethic is a principle which governs human actions. "Morals" are the practice of ethics. Ethics and moral can be regarded as applied philosophy. An environmental ethic is a principle which conceptualises appropriate and inappropriate action towards the environment. It means considering the environment as a part of the wider moral community. As this inclusion involves practical as well as theoretical changes in human treatment of the environment, the ethical principles which underly human treatment of the environment, are both theoretical and practical. This overview of the main types of environmental ethics refers both to underlying ethical principles and to the main practical consequences of these (the morals). Comments are made about how people's actual behaviour corresponds to this ethical-moral background. Ecosophy, although ethymologically linked to the above terms, refers to the basic rationale used in "deep ecology" (see section 3.6.). As such it is limited to the deep ecology terminology developped by Naess (1989).

3.2.Values, standards and principles

Values are very important in environmental ethics. Referring to a value, means asking what something is "worth" (in the sense of monetary value, for example). In this way, a particular value can be measured by asking "how much worth" that value posseses. Another question of importance to values is "what can we do with them ?". The question of "what we do with ethical principles and values in the environmental discussion ?" is the subject of section 4 of this text.

It is important to realize that values exist in relation to an individual in its societal context and to society as a whole. Therefore values should be considered, for example, in relationship to neighbours, future people, animals and the environment. It is of fundamental importance that the principles "governing" our actions in these relationships do not conflict.

3.3.Main types of environmental ethics

A wide variety of options exist when it comes to taking environmental considerations into account in an ethical framework. Taking environmental matters into account does not necessarily mean favoring the environment. A frequently encountered attitude is the traditional minimization of environmental considerations in socio-economic discussions. However, on the other side of the spectrum, one finds genuinely concerned environmental thinking. When it comes to dealing with environmental issues in ethics, the range covers pro-, through neutral, to anti-environmental thinking.

According to this background, Sylvan and Bennett (1994) describe three main types of environmental ethics:

a. The green "application" of standard ethics: many applications in this context may yield outcomes which are far from beneficial to the environment.

b. Adaptation or extension of standard ethics to accommodate environmental causes: an example of this is the adaptation of utilitarianism to animal liberation purposes.

c. New, non-standard ethics, which supersede established ethics. An example of this type of ethics is "deep ecology" which is discussed in section 3.5.

There are many other systems for classifying the variety of approaches in environmental ethics. For the purpose of this text the above system is used because it usefully classifies the wide array of approaches according to their level of commitment to environmental values.

3.4.Shallow environmental ethics: anthropocentrism (homocentrism) and ecocentrism

In Western philosophy, in general, humans have been the only objects of positive moral concern. Environmental elements such as non-human animals, plants, forests, water, air and landscapes were only included because they were human property or because they were of interest to man.

"The great fault of all ethics hither to has been that they believed themselves to have to deal only with the relationships of man to man" (A. Schweitzer).

Of central importance to anthropocentric ethical arguments is the issue that human well being depends upon the quality of the environment, and therefore it is in the interest of humans to preserve their environment. The environment is seen as a means to human ends and values. As these arguments clearly point towards human interest, they have a powerful appeal.

An eminent representative of this shallow environmental ethical approach is the Australian philosopher and historian of ideas, John Passmore. In Belgium, the ideas of Etienne Vermeersch (1994), who describes care for the environment essentially as an extension of the Christian moral principle of care for the neighbor, are closely related to this approach. Others link the anthropocentric approach in environmental ethics to the stewardship idea. This tradition sees man as a manager responsible for caring about the world. The shepherd metaphor (man caring for the world like a shepherd caring for his sheep) is frequently used. The stewardship approach dates back to the post-Platonic philosophers of the Roman Empire and has continued to exist in Western thinking ever since. The idea that human interest must dominate the

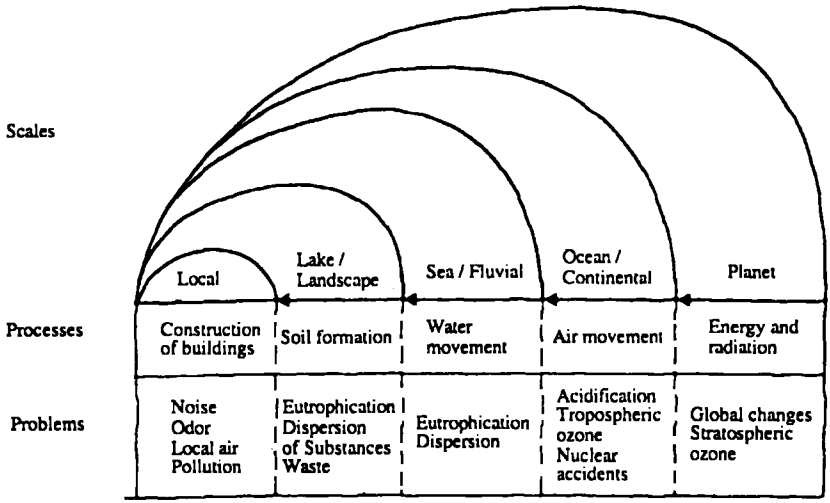

Figure 1 - Geographical scales of environmental problems; proceses and problems characteristic for local, regional, fluvial, continental and planetary scales

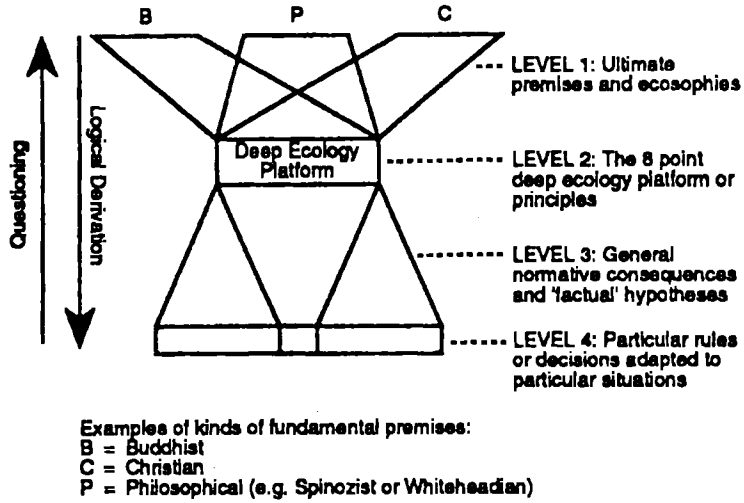

Figure 2 - The double pyramidical structure of deep ecology

interest of nature has been a constant element in Western philosophy. The Judeo-Christianic principle, claiming that only man has been created to God's own image, is also essential to the anthropocentric approach.

The basic manifestation of anthropocentrism in environmental ethics is that very few constraints are imposed upon our treatment of the environment. Our treatment of the environment is only limited to the extent that it does not interfere with the interests of other humans. Anthropocentric environmental ethics involves eventually a long term (transgenerational) point of view. For these reasons it has been described as resource management or husbandry. It leads towards shallow environmentalism.

Deep positions in environmental ethics are characterized by the rejection of the notion that humans and human projects alone are the sole items of value and that they are always more valuable than other things in the world. Deep positions regard the environment as valuable in itself. The environment has an essential value, which is greater than that which derives from its relationship with humans.

3.5.- A land ethic and the animal liberation movement: intermediate between anthropocentric and deep approaches

In anthropocentric or homocentric ethical approaches, the environment or at least parts of it are worth saving because they might -eventually in the long term- be of interest to humans. The next step, towards a deeper environmental approach, is to leave the "Sole Value Assumption" behind, and extend the ethical framework beyond the human realm.

A well known example of such an extension is the contribution of the American forester and ecologist Aldo Leopold (1949). His "Land Ethic" is founded on two principles:

a. A thing is right when it tends to preserve the integrity, stability and beauty of the biotic community. It is wrong when it tends otherwise.

b. The land ethic simply enlarges the boundaries of the community to include soils, water, plants and animals, or collectively the land.

Leopold moves the discussion forward on two fundamental fronts: he recognizes that nature and the environment have value-in-themselves as well as or despite any value they may have for humans. Humans are no longer the sole objects of moral concern; the ethical community is enlarged to become the ecological community.

The land ethic is characterized by its simplicity and remarkable intellectual beauty, but has far-reaching consequences. Leopold was aware of the need to integrate environmental and economic concerns to produce a system that is sustainable for other species as well as humans (Callicott, 1989).

Conceptually related to Leopold's Land Ethic is Singer's "Animal Liberation" approach which has become the underlying philosophy for the Australian and worldwide animal liberation movement. The approach depends upon the so called "Argument for Marginal Cases", which can be explained as follows: Humans differ from animals in having more sophisticated intellectual and emotional equipment, but they are the same in having the capacity to suffer and enjoy. We consider that this latter capacity is the source of rights independent of the other capacities; for we do not believe that intellectually handicapped infants may be used just as we please, and yet they are as little, or even less possessed of the more sophisticated capacities than many animals. Although, for the vast majority in our society, this argument seems exaggerated, it is inherently strong. It is the sort of argument that helped to abolish slavery, secure civil rights for blacks and equal opportunities for women.

In contrast to the dominant anthropocentric line of thinking in Western philosophy, animal liberation thinking does not use the arbitrary criterion of rationality to separate animals from men. Belonging to the human species is not enough to claim more and different (ethically underpinned) rights to animals. Defending the human species in this context is comparable to advocating racism (Singer, 1984; Regan, 1983).
The scientific background of the Animal Liberation Movement has a plethora of roots. The main ones can be summarized as follows:
a. the influence of the liberation movement: colonialism, racism and sexism were increasingly rejected and as a consequence traditional borderlines disappeared.
b. research work produced evidence of animal intelligence.
c. the way the human spirit is a product of the functioning of the brain was gradually clarified: the biological and biochemical steering elements were stepwise elucidated. The same fundamental processes were found in man and animals.
d. more recently genetic research has pointed to the far-reaching homology in the genetic material of man and his nearest evolutionary partners.
e. the "person" concept is questioned: the definition of "a person is", is a central issue in many ethical debates, ranging from induced abortion, in vitro fertilization and related fertility techniques, to euthanasia.
f. environmental protection and the relationships in environmental science have substantiated the holistic character of nature.
In comparison to Leopold's Land Ethic, Singer's theory has two distinct advantages:
a. Animals, particularly charismatic large vertebrates, are easier to identify with and thus more readily considered for inclusion in the moral context.
b. The objects of the arguments are more readily available to most people.
These two reasons may explain why more action is taken on the animal liberation movement than on the land ethic movement, although the two belong to the same family of environmental ethic approaches.
Besides the animal liberation movement, which fights for the interests of animals, there are several trends in environmental ethics which promote bio-centrism and a holistic approach to nature. The central tenet of these trends is that it is not man, animals or living organisms, but the biosphere as a whole, which deserves respect. Man is an inseparable component of this much broader vision of nature (Caldwell, 1975; Callicott, 1986).

3.6. Deep ecology

Deep ecology is an environmental movement founded by the Norwegian philosopher Arne Naess. The core idea of this viewpoint is the postulation that humanity is inseparable from nature. Neither individuals nor living organisms are important, but it is the totality of nature which has moral value. Human actions are only valuable if they benefit (stability, integrity, ...) the ecosystem as a whole (ecocentrism). As a consequence it is not possible to injure nature without injuring an integral part of ourselves. Environmental problems can only be solved by people who are able to make value judgments that go beyond narrowly conceived human concerns. People not only require an ethical system, but a way of conceiving of the world and themselves in such a way that the intrinsic value of life and of nature is obvious. They need an ethical system based on "deep ecological principles" (Naess, 1989).
This process of reasoning is called ecosophy (from "ecos" -house, place to live in, including its surroundings and "sophia" -wisdom). From this reasoning, stem not only an ethics, but also a pratical way of acting. These elements have an outspoken dynamic character, change

over time, (as Naess' ideas develop) and are therefore difficult to summarize. In general one can look into this issue by taking off with the idea that Deep Ecology has four levels. On the first level, are the sources of inspiration, insight, and intuition of the movement. They may be humanistic, ecosophical, Buddhist, or other. Intuition includes e.g. equal respect for all ways and forms of life (biospheric egalitarianism), the refusal to acknowledge that some life forms (or other ecological items) have greater or lesser intrinsic value than others, respect for complexity and symbiosis as conditions for maximizing diversity, strife towards human interference to an extent and scale far below that presently prevailing and the option for a population sufficient to sustain cultural, economic and other activities, and diversity. On the second level we find the platform which holds the whole movement together. This platform consists of principles or departure formulations derived from level 1. On the third level are generalized hypotheses. These are general attitudes towards the environment. The fourth level is the level of actions. These are specific to each case.

Deep ecology is not a unique approach towards an ecocentric (philosophical) movement. Another example is the "Deep Green Theory" developed by Richard Sylvan and Val Plumwood in Australia (Routley and Routley, 1980). This theory begins with the rejection of human chauvinism (the finding that all standard ethics are characterized by a prejudice in favor of "things human" and against "things non-human"). Deep green theory stands in ideological opposition to the dominant technocratic-industrial way. It provides a comprehensive alternative environmental philosophy (and as such is not based on intuitions inspired by religion, as is the case of deep ecology). Deep green theory is much more committed to analytic and critical methods and to rational procedures than deep ecology. Deep-green theory is more intellectual than intuitive, more scientific than emotional, more rational than extreme and maybe therefore currently less popular and widespread than deep ecology.

3.7. Sustainable development as an ethical concept

In the early to mid-1980s, sustainable development was emerging as the catchword to provide the frame of reference for environmental policy. It was heard with increasing frequency in conferences involving NGO's and government officials worldwide. The publication in 1987 of "Our Common Future", the Reports of the World Commission on Environment and Development (better known as the Brundtland Report, after the Commission's Chair, Norwegian Prime Minister Gro Harlem Brundtland), popularized the term "sustainable development" and gave the new paradigm momentum, enabling it to replace the scientific-technical dominated vision of environmental management and policy.

The Brundtland Report defined sustainability as "the rearrangement of technological, scientific, environmental, economic and social resources in such a way that the resulting heterogeneous system can be maintained in a state of temporal and special equilibrium". Sustainable development (SD) was defined as development "that is consistent with future as well as present needs" (WCED, 1987).

These definitions clarify different aspects of sustainable development:

a. SD has a worldwide spaceframe.

b. SD has a transgenerational timeframe. This links the sustainability concept with ethical questions concerning the "rights of future generations" (Susanne, 1994).

c. SD is about needs. In general terms, it means meeting the needs of the poor, even when this has as a consequence increased consumption, and decreasing consumption and production patterns in industrialized countries.

d. SD involves an interdisciplinary approach. In its simplest form it is about matching social, economic and environmental requirements.

1. Safeguarding biodiversity: Biodiversity is not a conflicting claim for resources by non-human beings, but the crux for future life. Life on this planet exists as a network of diverse, mutually inter-dependent forms of life. It is essential to preserve a minimum of diversity to secure the capacity to react and to develop in the future. Current estimates frequently call for 30 percent of the planet's liveable space to be given over to "nature" in the form of interconnected, undisturbed sanctuaries.

2. Living on biodiversity: Instead of shaping existing ecosystems according to the necessities of a few crops or animals (e.g. the Green Revolution) and, therefore, permanently reducing biodiversity and trying to uphold non-sustainable ecosystems, agriculture and households should try to live in self-sustaining ecosystems by using all the components of existing ecosystems.

3. Minimising interference with ecosystems: Existing carrying capacities need to be respected. Human-induced waste and flows of materials should be minimised. Whatever is taken out of nature should be used to the greatest extent possible. We need to know when to stop recycling.

4. Creating and maintaining positive externalities: If an individual action also serves another person or group without cost or with very little extra cost, then, besides copying the inter-dependence of an ecological web, it would be the most efficient way to organise human societies.

5. Organising human societies according to 1 - 4: Any group of human beings following these points would automatically have to start organising itself first of all to share as much as possible. Everybody minimises his or her interference with the biosphere, not only by reducing his or her own demand or using everything to the greatest extent possible, but also by transferring one's own surplus to fulfil someone else's needs and stop unnecessary activities from being undertaken. Secondly, society has to develop a social structure that favours sharing, let us say through tax incentives, and positive externalities through institutional structures like common property and co-operatives.

6. Consciously evaluating one's needs: Desires are infinite. Everyone should try to develop a sense of the purpose of what one is doing. By trying to look inside to see if the consumption of certain goods or service is really adding to one's happiness, one may develop his or her own yardstick enabling one to say, "I have enough".

Box 1 - Guidelines for sustainable development (Schutz, 1966)

Thus "sustainable development" is not only subject of scientific research or an anchorage for environmental politics (Porter and Brown, 1996), it also has ethical connotations and implications.

Part of the attractiveness of SD is that actors in the environmental discussion can hardly afford to argue against the idea. This is because it calls for responsibility for environmental degradation on a scale ranging from the local to the global. Moreover it appeals for solidarity between generations. Both the global spaceframe and the transgenerational timeframe are important ethical aspects of the SD discussion. On the other hand, they are also responsible for a certain degree of vagueness about the content of SD, enabling, for example, industry to understand different things by SD than environmental organizations do.

Schütz (1996) has described other ethical dimensions of the sustainability discussion:

a. Next to ecological and economic dimensions, sustainability has cultural specifics such as customs, myths, taboos, religious beliefs, language barriers, policies, etc. They apply to a given culture in a particular setting and should be taken into account when working towards sustainability. Any definition of sustainability has to be culturally acceptable in order for it to be effective.

b. When it comes to specifying SD in operational terms, the concept might be interpreted along the lines shown in box 1. This box does not reflect a full consensus on the issue. Rather, it lists the issues which are most frequently referred to in current literature. Organizing our environment, "minimizing interference with ecosystems" and putting limits to desires are ethical options. Sustainability should therefore not only be interpreted as scientific eco-management, but also as an attitude co-determined by ethical choices.

c. The issue of the relationship between SD and ethics becomes difficult when we pose the question of whether (natural, human and applied) sciences and ethics are sufficient in themselves, in order for us to attain sustainability. Authors are increasingly arguing that they are not. What seems to be missing is the defining glue between the above mentioned elements. Some describe this glue as legitimacy, loyalty, respect or affection. In any case, debate definitely shows that even by including ethics in SD, one does not close the discussion about its content.

The SD paradigm dominated the environmental discussion in the late Eighties and Nineties. These days, a new "environmental security" paradigm is emerging. This view sees environmental degradation as related to, for example, availability of and accessibility to good drinking water quality, environmental displacements and the increasing risk of war. Although the unraveling of this new concept has only just begun, ethical considerations will be even more important in this discussion than in that of SD.

3.8. Gaia theory: ethical aspects

The Gaia theory was originally developed by the British physicist and environmental researcher, James Lovelock. Since the Seventies, the theory has gained experimental ground through the contributions of the American microbiologist, Linda Margulis.

Lovelock views the planet earth, Gaia, as a living organism that optimizes conditions for her survival. When an organism "benefits the environment as well as the organism itself, then its spread will be assisted. Eventually, the organism and the environmental space associated with it, will become global in its extent. The reverse is also true: any species that adversely affects the environment is doomed, but life goes on" (Lovelock, 1986).

Central to the Gaia theory is the idea that the earth is a self-regulating entity that maintains the terrestrial and atmospheric conditions that make life possible. Living organisms, acting altogether in evolved patterns of cooperation respond to changes and regulate the planetary

environment in ways that ensure their own collective survival. By considering the earth alive, the Gaia theory does not mean that it is covered or occupied by life. Gaia refers to a system of different species and ecologies which constitute "the largest self-healing and self-regulating organism" or "total planetary being".

As such, the Gaia theory is holistic in its approach: it sees biota, rocks, air and oceans as tightly interlinked entities. The theory promotes the idea that the planet's evolution should be studied as a single process and not as several separate processes studied in different university buildings.

The Gaia theory has a wide range of implications. From a theoretical point of view, it promotes thinking on the environment in terms of cooperation and synergism. It is unclear these days whether this is complementary or opposed to the Darwinian view of competition and selection. Moreover it adds a broad scale environmental dimension to the Darwinian concept of evolution. This debate might lead to a fruitful inquiry of the fundamentals of contemporary biology (Barlow and Volk, 1992).

It also provides new views on ecosystem function, systems theory and modeling. General Circulation Models (GCM's), which are of central importance to the global change discussion, are interesting to look at from the perspective of Gaia. Most of them simplify the biosphere to a cycling of carbon and nitrogen, with no ecology and no succession, missing out all the most important things for Gaia. As long as they remain incomplete, there is a fair probability that their predictions will be wrong.

It is not only on climate change issues, but also on questions concerning the relation between the formation of the earth's crust and its living organisms and the implications of pollution, that Gaia offers new and often complementary visions to traditional scientific knowledge.

The ethical implications of Gaia are very different from the other approaches. If we look at the world from a geo-physiological point of view and consider our activities as a part of the super-organic life of Gaia, we might choose to profoundly reconsider our present habits of exploitation. We might conclude that agriculture and forestry were acts of global ecocide. Would we mine our liver for nutrients ? Would we raze our hair and plant our scalp with tomatoes? Lovelock says on this "I see the world as a living organism of which we are a part -not the owner, not the tenant, not even a passenger on that absolute metaphor 'spaceship Earth'".

But maybe the main ethical implication of Gaia is in the criticism it provoked from its opponents. They condemned the theory for being theological -that organisms, in order to cooperate in the fashion represented by Gaia, must somehow know what they are striving towards or must follow predestined paths (Fairbairn, 1994). Although Lovelock has responded to this criticism, for example by developing a mathematical model to illustrate how the unconscious behavior of interrelated life forms could regulate a natural environment, this theological argument made the theory suspicious to academics. This critical attitude was also strengthened by the popularity of the theory among environmentalists, religious devotees and those grasping to the universe. Moreover traditional science does not like the metaphoric phrasing in Gaia -the bio-cybernetic universal system, earth as a super-organism or geo-physiology (the blood and nerves of the planet). Some opponents condemned the theory as "Science for people who do not believe in science".

The Gaia theory has survived more than twenty years of criticisms. The idea that life has a profound influence on the environment, is much closer to mainstream thinking today than it was in 1979. Even though the majority of scientists still remain silent, if not

suspicious, about Gaia, the theory is a stimulus to useful discussion on a number of fundamental scientific issues. It results in environmental-ethical considerations which can be allocated to the ecocentric side of the spectrum of ideas.

4. Application of ethics in environmental discussions

4.1.Is the scientific answer unsatisfactory ?

Environmental decision making, environmental management and environmental policy were for many years dominated by the unproven conviction that environmental problems (if they exist at all) were the unavoidable side effects of scientific and technological progress. The discussion was characterized by an optimistic vision which claimed that the undeniable advantages resulting from the scientific-technological progress in terms of welfare and well-being would be far more important than possible negative side effects of this progress. Concerns regarding the possible risks associated with certain technologies persisted, but were provisionally answered with the argument that science as such is neutral and that it can not be blamed when some "individuals" apply scientific knowledge improperly. When commentators pointed towards negative consequences of progress in science and technology, the standard answer was that these problems could be resolved with more and better science and technology. This is the core reasoning of what is known as "Scientific Technical Optimism" (STO) (Vermeersch, 1988).

Today we know that the STO concept is an oversimplified myth to which many scientists and technologists ascribed. Environmental discussions concern not only science and technology, but also social, criminological, psychological, economic, policy and ethical issues. This forces us to take some distance from the STO attitude. No one doubts that rational thinking is preferable to irrational or less rational approaches, or that reliable knowledge is preferable to less or unreliable data. However, it does not follow from this that all developments resulting from science and technology are intrinsically desirable, beneficial or good. Scientific and technological development are no longer viewed as ends in themselves. Increasingly, as the dangers associated with new technologies have come to light, new innovations are evaluated with a more critical eye.

Among others, a number of specific environmental factors have contributed to the more critical attitude towards STO. "Thinking globally" is one of them. This means thinking about the environment with a holistic and globalizing attitude that considers data not only from the basic sciences but also from the applied and human sciences.
Besides "global thinking", the idea of "finite resources" has also contributed to critical thinking about STO. The Second World War, post-war period and, to some extent, economic prosperity of the early Sixties, gave raise to the idea of infinite growth. GNP's and other economic indicators were expected to grow yearly. There were no borders to scientific and technical progress. The unattainable was the only limit. This idea was put into practice, for example, by massive imports of cheap oil and gas. When this presented practical problems there was nuclear energy thereafter, that the ultimate energy problem-solver, controlled nuclear fusion. Environmental facts and figures conflict with the habits and practices associated with the idea of infinite growth: the earth, the earth's surface, water, fertile soil and air of good quality are all limited. Most energy sources, definitely the most popular ones currently in use, the earth's minerals and biological resources are finite. At an increasing number of

places and for a steadily increasing number of parameters, the carrying capacity of the system has been reached. Exceeding these limits results in water shortages, altered temperature and moisture regimes, erosion, poverty, environmental displacement and, potentially even, wars.

The "global thinking" and "finite resources" ideas have given rise to environmental which is of a higher degree of complexity than the naive STO attitude. The approach developed by the (biological) ecologists is one more complex way of looking at the environment. Ecologists look at nature as a system of complex interrelations between the living organisms themselves and their non-living environment. Applying this paradigm to the human environment, the global ecosystem as a whole, is an obvious step. The question, however, of whether such a human ecological approach to complexity can provide a satisfactory answer to current environmental problems, remains as yet to be answered.

4.2.Ethical contributions to contemporary environmental questions

4.2.1.Introduction of new agents in the environment

It is remarkable that a number of environmental discussions today still have roots traceable to the STO attitude. The admission policy onto the commercial market, for pesticides, food additives and plants and animals modified by recombinant DNA technology is an indicator of authorities continued adherence to the STO doctrine. Environmental groups and other social actors, such as consumer's and women's organizations, are trying to broaden the discussion. They have put a number of ethical questions on the agenda which should be discussed in the near future. In Europe, allowing a particular pesticide to be sold on the market, is driven and controlled by national and European authorities. This process is based upon demonstration of the properties and applicability of the new compound and on the relative absence of demonstrable and testable effects on man (and more recently also on the environment). All risks, which are scientifically and technically testable and quantifiable, are controlled. The few, minor aspects which are not yet controllable today, will be brought under scientific supervision tomorrow when research progresses.

This point of view seems to be increasingly incomplete. The product by product admission policy automatically results in an ever increasing number of pesticides on the market. Recent data indicate that exposure to this mix of substances results in increased risk of breast cancer and fertility problems, a factor which is not taken into account when the admission of each individual pesticide is considered. The question "do we really need over 600 active pesticide products in a few thousand of preparations in the EU" is one which deserves more attention. The answer is only to a limited extent a matter of "old products" not complying with the up-to-date state of environmental knowledge. It is a matter of values, choices and thus ethics. It means considering questions about the limits of consumption and about "how much is enough ?".

The same questions apply when it comes to the regularization of food additives and to the introduction of new recombinant DNA-technology modified products. Again, science does whatever is possible to do, but we should also consider the question of whether we really need all the food additives and genetically modified and patented plants and animals ?

The problem, however, seems to be broadening. Even in the recent mad cow disease debate the British and European authorities, once again, opted for the STO attitude. The strategy failed, however, and the result is that the public lost trust in the controlling body.

It has become more and more apparent that in all these cases, ranging from pesticides and food additives, to genetically modified tomatoes and soja, to battery raised chickens, to fish farm shrimps and salmon, and to slaughter of feed cows, there is increasing demand for a move from fast grown quantity to agricultural practices based upon respect for plants and animals. This move has been catalyzed by scientific data and unsound practices, but is basically driven by fundamental ethical choices.

4.2.2. Environmental standard establishment and maintenance

Another area where ethics interfere with the environmental discussion, is in the establishment and maintenance of standards. Environmental standards were originally meant to protect the human health against pollution. After the London Smog period, sulphur dioxide and particulate standards were established in such a way that human health would be protected in the most complete way possible.

Nitrogen oxides standards protect against lung infection and nitrate standards aim to prevent methylhemoglobinemia ("blue baby syndrome"). The original intention of environmental standards is still the same. But, especially in those instances where standards risked hampering "business-as-usual" activity, they were subject to a wide range of modifications, which resulted in a less rigorous protection of human health. Some of these modifications have interesting ethical dimensions:

- For carcinogenic substances, as a rule, no safe value can be established.

Standards are thus set at the level where the introduction of a new carcinogen into the environment, does not cause more than 1 extra cancer death out of 1.000.000 deaths. The figure is however completely arbitrary and inevitably associated with a moral judgement on how many deaths the use of a new carcinogen might cost.

- For many pollutants, the ambient concentrations are so high that protecting human health would necessitate measures which have a significant impact on the way people live. High tropospheric ozone concentrations, in particular, are known to interfere with human lung function and the respiratory volume of children, from a 160 μg/m3 for 3 hours and up. Such concentrations are regularly exceeded in the summer. Moreover the ozone conditions of several cities such as Brussels, Milan, Athens and Mexico City, have been shown to be causally responsible for higher rates of mortality. In spite of these manifest health effects, no effective measures have been taken to combat this form of pollution. Minimizing car traffic and establishing preventive action upon other nitrogen and volatile organic substance emittors are politically unattractive, but by not instigating these measures, one is clearly making implicit ethical choices against human health and environmental quality.
- Standards for pesticides in drinking water in the EU, are an exception to the rule that standards are based upon health criteria. In the EU, drinking water should not contain more than 0.1 μg/l of any particular pesticide and the sum of the different pesticides should not be higher than 0.5 μg/l. This reflects the philosophical principle that an EU citizen has the right to drink water which does not contain pesticides. The numbers coincide roughly with laboratory method detection limits in the 1970s, when the Directive was established. Despite this directive, drinking water samples from across the EU, show an increasing number of instances where samples exceed these values. This has not resulted in an effective policy to reduce pesticide input, but generally, a policy of exemption from the standard has been applied. As a rule, the regulators who provide the exemption, base their attitude on the argument that health is not threatened by allowing higher concentrations of pesticides in drinking water. This illustrates how easily ethically based standards are abandoned in "real life" situations, where the fundamental choice is between environmental quality and politically unattractive policy.

5. Discussion and conclusions

The development of environmental ethics grew from the concept of the "environmental crisis". Clearly the environment is threatened in many places. Desertification shows how the carrying capacity of the system has been exceeded in many parts of the earth and the CO^2 and other greenhouse gas rises reveal a global phenomenon of a dimension and possible impact the earth has never experienced before. On the other hand, the "crisis" element of this situation has no real scientific grounding. Environmental problems are the result of gradual changes. When they reach critical values, sudden effects may occur, but the global picture is one of steady evolution. The question arises as to what extent the environmental ethical movement is based on psychological overacting. In this context, lines of thinking such as deep-green theory which are more rational and less intuitive than deep ecology, might proove to have a more sound basis for future environmental thinking.
Besides the environmental crisis, the duality of anthropocentrism-ecocentrism is essential to an understanding of the evolution of ideas in environmental ethics. No doubt "Man" is not the center of the universe, the measure of all things or the purpose of creation. Science shows that humans are only a part of the global environment. Accordingly, from an ethical point of view, it is a mistake to give exclusive or arbitrary preferential consideration to human interests as opposed to the interests of other beings or environmental networks. Nevertheless, there is an innate element of anthropocentrism in ethics. Ethics is about values and inevitably, values are defined by people. The core of the problem is that human values are frequently targeted towards non-human elements. As a consequence, anthropocentrism is frequently understood as meaning an excessive concern with humans, but not with human values themselves. By focussing too much on the contradiction between anthropocentrism and ecocentrism, one misses the nuances of these terms and the discussion might even be counterproductive (Hayward, 1997).

Overviewing the impact of environmental ethics on environmental practice, management and policy, produces a puzzling picture:
- ethics and ethical values enter the discussion at very limited times during the decision making procedure. Environmental decisions are driven more by science, technology and economics than by social and ethical considerations.
- In the rare cases where environmental decisions are based upon ethical considerations, e.g. drinking water standards, their maintenance is easy to disadvocated. As a rule, health protection arguments are used to defend the offence of law by drinking water companies and authorities.

On the other hand, there seems to be an increasing demand for ethical considerations in the environmental discussion. The limitations of regulatory systems uniquely based on the scientific-technical approach have become more and more obvious. The public desire for "good" food, "safe" drinking water and "healthy" air necessitates an answer which in the future will also entail ethical decisions.
However, the nature of environmental problems is also changing. Lack of environmental security is at the root of the problems of insufficient drinking water and soil erosion. These problems have lead to an increasing amount of areas characterized by agricultural yield declines, reducted incomes and high levels of migration. This has created a climate conducive to the creation of wars, essentially caused by environmental degradation.

In this changing environmental picture, the scientific community has a specific responsibility. Specialization and reductionism entail the risk that scientists pay insufficient attention to the consequences emerging from research in related fields of knowledge. This risk is increased by the fear of loosing authority when one expresses ideas in a field outside ones own specialisation. This "sea urchin syndrome" can only be overcome when scientists are trained in a way that produces professional, broader humanistic thinking, which values and respects life and the well being of the ecosystem. Appropriate educational approaches should be developped to this end, which are characterized by:

- multi- and interdisciplinarity
- the interpretation of existing information, rather than the accumulation of scientific data
- widening of the scientific field, e.g. by linking scientific with cultural aspects
- encouraging abstract thinking.

The final target of the educational approach should be to raise awareness of personal responsability and commitment towards a sustainable world in which environmental quality is an integral part.

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References

Barlow, C., Volk, T., 1992. *Gaia and Evolutionary Biology*. Bioscience, 42, 686-693.

Borden, R., 1991. *Human Ecology in the United States. In: Human Ecology - Coming of Age: an international overview*. S. Suzuki, R.J. Borden, L. Hens Eds. VUB-Press, Brussels, Belgium.

Caldwell, I.K., 1975. *Man and his Environment: policy and administration*. New York. Harper and Row.

Callicott, J.B., 1986. *The Methaphysical Implications of Ecology*. Environmental Ethics, 8; 301-316.

Callicott, J.B. 1989. *In Defence of the Land Ethic*. State University of New York Press, Albany, NY, USA.

Debeuckelaere, K., Cashman, L. 1997. *EC Environmental Legislation*. In: *Environmental Management in Practice: Analysis, Implementation and Policy*. B. Nath, L. Hens, P. Compton, D. Devuyst (Eds.). Routledge, London, UK. In Press.

Ehrlich P.R., Ehrlich A.H., 1991. *The Population Explosion. Simon and Schuster*, New York, USA.

Fairbairn, B., 1994. *History from the Ecological Perspective: Gaia theory and the problem of cooperatives in turn-of-the-century* Germany. American Historical Review, 1203-1239.

Hatcher, R.L., 1996. *The pre-Brundtland Commission Era*. In: *Sustainable Development*. B. Nath, L. Hens, D. Devuyst Eds. VUB-Press, Brussels, Belgium. pp. 57-80.

Hayward, T., 1997. *Anthropocentrism: a misunderstood problem*. Environmental Values 6, 49-63.

Jonas, H. 1966. *The Phenomenon of Life: Towards a philosophical biology*. New York, Harper and Row, USA.

Leopold, A. 1949. *A Sound Country Almanac, with other essays on conservation from Round River*. Oxford University Press, UK.

Lovelock, J. 1979. *Gaia: A new look at life on earth*. New York, Oxford University Press, UK.

Lovelock, J.E. 1986. *Gaia: The world as a living organism*. New Scientist, 112, 25-28.

Luneburg, W. 1997. *Environmental Law in the United States*. In: *Environmental Management in Practice: Analysis, Implementation and Policy*. B. Nath, L. Hens, P. Compton, D. Devuyst (Eds.). Routledge, London, UK. In Press.

Meadows, D.H., Meadows, D.L., Randers J. 1991. *Beyond the Limits. Confronting Global Collapse; envisioning a sustainable future.* Eartscan Publications Ltd. London, UK.
Naess, A. 1984. *A Defence of the Deep Ecology Movement.* Environmental Ethics, 6, 265-270.
Naess, A. 1989. *Ecology, Community and Lifestyle.* Cambridge University Press, Cambridge, UK.
Porter, G., Brown, J.W. 1996. *Global Environmental Politics.* 2nd Ed., Westview Press Inc., Boulder, Co., USA.
Regan, T. 1983. *The Case of Animal Rights.* Berkeley, University of California Press, USA.
Rouch, H. 1987. *La Maternité mise à nue par ses Propriétaires.* Cahiers du Grif, Paris, France. p. 39-50.
Routley, R., Routley, V. 1980. *Human Chauvinism and Environmental Ethics.* In: Environmental Philosophy. D.S. Mannison, M.A. Robbie, R. Routley (Eds.). Australian National University, Research School of Social Science, Canberra, Australia.
Schütz, J. 1996. *What has Sustainability to do with Ethics ?* In: *Sustainable Development.* B. Nath, L. Hens, D. Devuyst (Eds.). VUB-Press, Brussels, Belgium. pp. 137-157.
Singer, A. 1984. *A Defence of the Deep Ecology Movement.* Environmental Ethics, 6, 265-270.
Susanne, C. 1994. Ecologie en Ethiek. In: *Wetenschappen en Filosofie: Verwijdering of ontmoeting ?* F. Verbeuren, L. Apostel Eds. Antwerp, Belgium. pp. 13-22. (In Dutch).
Sylvan, R., Bennett, D. 1994. *The Greening of Ethics.* The White Horse Press, Cambridge, UK.
Testart, J. 1986. *l'Oeuf transparent.* Flammation, Paris, France.
Vermeersch, E. 1988. *De ogen van de Panda.* Marc Van de Wiele Publ., Brugge, Belgium. (in Dutch)
WCED - World Commission on Environment and Development. 1987. Our Common Future. Oxford University Press, Oxford, UK.

Notes

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