Armstrong, A.C. 2009. *Viewpoint* - Further ideas towards a water ethic.
Water Alternatives 2(1): 138-147

Viewpoint - Further Ideas towards a Water Ethic

Adrian C. Armstrong
School of Geography, Earth and Environmental Sciences, University of Birmingham, UK; drmudpie@aol.com

ABSTRACT: This essay expands the water ethic of Armstrong (2007) by identifying four main functions of water: as a source of life, as a land-forming element, as a habitat, and as a mover of materials (i.e. a geomorphological agent). It is suggested that from these functions, four guiding principles can then be derived: 1) in allocating water, human beings allocate life potential; 2) altering water fluxes affects the function of a whole system; 3) water is a (fundamental) component of the earth system in its own right; 4) water fluxes are essential for the continued function and maintenance of both biological and non-biological systems.
From these a full ethical evaluation of any proposed action could be based on an environmental axis as well as on the economic axis in decision making. Such full analyses can often be reduced in practice to a series of 'rules of thumb' for everyday decisions. Some candidate rules are suggested. Focusing on practical decision making and action on the function of water offers a potential way of implementing the Leopold 'land ethic'.

KEYWORDS: Water ethic, water for life

INTRODUCTION

This essay develops the ideas expressed by Armstrong (2006, 2007) who outlined the background and some of the themes that might underlie a 'water ethic'. The water ethic itself was stated as a deliberate paraphrase of the famous 'land ethic' of Leopold (1949). However, further development of the idea requires further restatement, as the ideas are expanded, and some of the implications identified. However, no idea is articulated in isolation, and this essay draws on the ideas of many authors, including Attfield (2003), Callicot (1989, 1999), Palmer (1997), and Prescoli et al. (2004) who introduce and summarize a series of essays from an international perspective sponsored by UNESCO.

The water ethic offered here is considered a way of looking at the environment. It is not an attempt to elevate water to a quasi-divine status but to provide a focus for practical decision making. A focus on water provides a way of looking at the whole of the landscape system in a holistic fashion that embraces not only the living but also the physical aspects of the landscape. The water ethic is based on recognizing water as a source and a requirement of all life, and so is applicable to all forms of living material, animal or vegetable. It also builds on an appreciation of the role of water within geomorphological, hydrological and biological systems.

The water ethic proposed here assumes a holistic ethic of nature in which all of the natural world has a value and should, where possible, be preserved. Such an ethic can be derived from one of several philosophical positions, and is in general applicable across many of them.[1] The wide variety of ethical positions on the environment described, for example, by Dryzeck (1997) is not explored further here (but see Armstrong, 2006). Essentially, this essay thus goes beyond both the utilitarian and simple consequentialist ethics by assuming a value in the natural world. The way this value is identified is one

[1] In particular, it draws on the feminist and Deep Ecology views of nature, as well as on the Christian understanding.

of the key roles of any philosophy of nature (Attfield, 2003), but once such a value has been identified, the rest of the ethic in this paper follows.[2]

This water ethic is suggested as a practical tool to help in the deriving of decisions, by providing a framework in which to evaluate and place the possible consequences of an action. It is thus a practical ethic, designed to help human beings make decisions in specific cases. It thus goes beyond the observation of Prescoli et al. (2004) that "… the problems of water management are perceived largely in terms of such factors as human health, food production, economic development, loss of human life, displacement of persons and economic losses", and extends the realm of its ethical consideration to the whole of the natural system, and thus embraces all that Leopold (1949) included in his concept of 'land'.

WATER FUNCTIONS

A water ethic can be based on the functions of water within the land system and the associated ecosystems. Four such functions relevant to an ethical evaluation can be identified:

Water is essential to life. The first basic observation is that water is essential to all manner of life, and to the functioning not only of the living but of the inanimate landscape.[3] Those life forms that appear to function without water, given that they are so rare, are the exception rather than a substantial and considerable subset. Hence, water is essential for all vegetative life, a fundamental component of the process of photosynthesis, and also the major carrier for nutrients within the plant structure. Consequently, water availability is critical to the building blocks of the plant system that provides the basic energy source for herbivores and higher components of the food chain. These animals higher up the food chain, additionally, nearly always require water for their own functioning, particularly in the circulation of oxygen and nutrients in their blood. The link between water and life is most easily observed in arid landscapes, where life is concentrated in those few locations where water is available, and in the regular cycles of plant growth, and consequent animal migrations, that follow water availability in seasonally arid landscapes.

Water is a land-forming agent. Water is a basic and central component in the creation of the landforms that form our landscapes and environments. Within the context of the geological structures, most processes of landform development involve water to some degree or another: even the most arid of landscapes show the effect of flowing water where and when it occurs unless they are dominated by wind-blown sand. Moreover, water is involved in many weathering processes; it is often implicated in the mechanisms of mass movement processes; it is the principal agent in coastal processes; and is the primary mover in systems based on rivers, sand, and streams; and is the transport medium for most sedimentary deposition. Perhaps volcanism and wind erosion are the only major geomorphological processes that do not involve water.

Water provides landscapes and habitats. We also note that water is an essential component of any landscape – where it is visible as streams and rivers, in wetlands and in water bodies such as ponds, lakes and seas. These are, however, more than visual units (although often highly valued as such); they are also habitats in their own right, with their particular associations of flora and fauna.

[2] The author states his own personal position is derived from a Christian understanding of the worth of creation. The world and nature are herein valued because they are the work of the creator who saw that it was 'good' (see Genesis 1). We reject the argument of White (1967) that Christianity led to an essentially exploitative attitude to the natural world; but rather assert the role of humankind as the gardener of Eden given in the creation myth of Genesis 2, so giving it a stewardship model of responsibility for the use it makes of creation. We also note that this stewardship concept is present in other religions. For example, Prescoli et al. (2004) state: "Islamic philosophy… distinguished between the concept of God's fundamental ownership of resources and man's managerial ownership", and the position of the environment within Islam is further expounded by Khalid and O'Brien (1992). The extent to which water and other environmental issues are included in other religions is reviewed for example by Jamieson (2001).

[3] In human terms, Prescoli et al. (2004) assert: "There is no life without water and those to whom it is denied are denied life". I argue that this insight should be expanded from its anthropocentric focus to include all life.

Water carries fluxes in the landscape. Water, by its very nature is also a medium for the transport of material within organisms, providing the major carrier for materials in life systems (e.g. as sap-flow in plants). The implication for a developing ethic is that it is not more than just the quantity of water that is important, but also its qualities, in terms of dissolved and suspended constituents.

An ethic based on the allocation and protection of water and water functions can be seen as parallel to the land ethic of Leopold (1949), but it does so, in what is in many ways practical, as it concentrates on a measurable and manipulable element, rather than on the rather nebulous concept of a 'land'.

GENERAL PRINCIPLES FOR A WATER ETHIC

It is possible to base an ethic on the maintenance of the functions of water. To do this, four general principles are suggested, each based on one of the four major functions of water:

The first principle is that *in allocating water, we are effectively allocating life*. In particular, taking water from the system (e.g. for human use) means that generally water is withdrawn from another potential use denying other elements of the ecosystem the same use potential. (Other actors or processes can be said to do the same, but they are not ethical agents.) It is this link to life that makes water and its allocation, of such enormous ethical concern. In situations of water scarcity human use of water will thus have an immediate negative impact on the life of non-human species. It is only where water exists in superabundance that the withdrawal of water is ethically neutral, but even flooding has an important function in landform development. If this removal is small, the effect is minimal, but can easily be large. Examples where overabstraction has dried up rivers or adversely affected wetlands can easily be found. Equally, discharge of water in another place (e.g. as sewerage outfall) distorts the natural patterns, and can create new and possibly undesirable (certainly disturbed) landscapes, due to the differing quality aspects of the discharged water.

A second principle is that *altering the fluxes of water in the landscape affects the functioning of a whole hydrogeomorphological system.* Extracting water for human use decreases the capability of water downstream to carry fluxes of sediment and nutrients through the landscape system. This will, in turn, affect the ability of the fluvial system to continue its landscape-forming activities, just as it will also affect the ability of the same fluvial system to sustain freshwater aquatic life systems. The same observation can then be made that discharging water (by returning water from sewage works, or by diverting flows as a drainage scheme) also affects the behavior of the fluvial system downstream. A 'natural' discharge regime for a river is (in general) in equilibrium with its form. Increasing or decreasing flows can lead to morphological changes (both erosion and deposition) that have further 'knock-on' implications on the visual, functional, and ecological functioning of the geomorphological system. Similar comments can be made about the engineering interventions in channel functions (by canalization, dredging, or damning) which lead to similar impacts on the functioning of the hydrogeomorphological system.[4] The continued role of water as a transport agent in the geomorphological and sedimentological system can then be recognized as a major factor of health in the land system. Disabling or limiting the transport capacity of running water can lead to excessive sedimentation, as exemplified by the frequent sedimentation of reservoirs, and the starvation of downstream sediment-receiving systems. Although rarely observable in the time frame of normal human attention, the long-term effects are nevertheless real. Many coastal and fluvial systems are dynamic and have shown to be significant over the time scale of human history. The coastal zones for example, throughout the world, contain main sites of long-defunct silted-up ports that record the locations of past shorelines.

The third principle is that *water is in its own right a component of the landscape*. Consequently, preserving water also preserves elements of the landscape; and altering the distribution of water destroys or disturbs landscape elements. Nowhere is this illustrated more dramatically than with

[4] So generating the whole field of study of 'managed rivers'.

respect to the drainage of wetlands, where manipulation of the water environment has completely changed the characteristics of the landscape (Maltby, 1986). The role of water in providing visually attractive and desirable landscapes is particularly obvious in the way human beings compete for access to these facilities (as house prices are inevitably high adjacent to seas, lakes and rivers, reflecting an amenity rather than a functional advantage, certainly in the UK). Human beings also use artificially created water units (fountains, dammed rivers, ponds) to enhance their own environments. Hence, protecting natural water bodies seems to be an automatic reaction (although perhaps culturally conditioned and learnt, and even led by fashion).[5] This reaction does not however extend to all such bodies, and wetlands have, in particular, been often seen as unpleasant places to be tamed and civilized (Giblet, 1996).

The fourth principle is that *we need to consider not only the quantity but also the quality of the water fluxes in the system.* If water is to be a source of life, it must retain its original chemical balances; it must carry the nutrients that provide the bases for vegetative life; in places, it needs to contain the solutes that create the landforms (e.g. tufa-derived landforms); it must not carry unwanted components, such as leached pesticides that will adversely affect life in other parts of the system or nutrients that can lead to eutrophication problems; but even 'clean' water can upset natural balances, for example between freshwater and saline water in brackish ecosystems.

GOOD AND BAD IN WATER ETHICS

One of the functions of any ethic is to define what is good and bad – and so identify those things that ought to be done, and those that ought not to be done. Armstrong (2006), in a deliberate attempt to parallel the land ethic of Leopold (1949) has already suggested: "A thing is right if it enhances the ability of water with the ecosystems to maintain life, and wrong of it decreases that ability". However, such a statement needs to be further expanded, perhaps to the point where it can no longer be expressed in such aphoristic terms.

The water ethic can be seen to give a simple description of what is bad: those things (actions) that alter the availability of water to any component of the water system are bad. A simple (we might even say naïve) formulation identifies almost every human action as in some way bad, as any human use of water will reduce or reallocate the availability of water elsewhere. Such an absolutist position can be defended only if a pristine (i.e. a non-human-affected) environment is the ideal.

The ubiquity of the impact of human activity reminds us of the less-than comfortable conclusion that everything human beings do (even breathing) in some way affects the water balance of those systems around them. It might therefore seem that everything human beings do will end up on the bad side of the environmental balance. Such a conclusion might be logical, but can only lead either to collective depression or a 'who cares' disregard of the environment. A practical ethic thus requires a less absolute definition of good and bad that allows human beings to exist and to operate some sort of calculus that sums up the good and bad of their actions. This then requires, at least in principle, a system in which it becomes possible in theory to examine all the consequences of all decisions, so defining every impact of a water use action, beginning with its impacts on all users and potential users (both present and future), on all ecosystems within the water realm, and all landscape features.

[5] Witness the development in the 18th century in England of the landscaped park, in which dammed rivers that became lakes were a fashionable feature. Such fashions often, however, express a deeper understanding of the role of and the need for water. Throughout the world, gardens are an expression of humanity's desire for space and recreation, and these almost inevitably require, use, and involve water. The complex interaction between human awareness of the natural landscape, and its cultural images of this landscape is explored at length by Schama (1996).

Human activity is however normally intended to bring some good, at least to those undertaking the actions.[6] Most actions with environmental implications are undertaken to achieve human benefits: housing, economic development, crop irrigation, basic water supply, river management, flood protection. All these actions are intended to benefit humans, who need places to live, food to eat, and safety from floods. The use of a water ethic that includes all the other water uses enables human beings to identify the consequences of these actions within the wider non-human context, so not elevating the natural condition to an absolute position, but placing it in the context of human needs and aspirations.

This requires a metric for each component, defining for each the good and bad impacts. It may be possible in some cases to define this in terms of more or fewer individuals of a species, or greater or lesser area of a given landscape type. However, this may be more difficult to establish for some species, and may be highly non-linear as, for example, when sudden increases in predator species may impact on prey species. It is also necessary to establish a weighting system, to describe the importance of every subcomponent, and of specific species and ecosystems. These weights would generally give high positive values to fragile features (ecosystems, landscape units), and to rare or infrequent elements. By the same token, common features that are robust and easily replaced would carry lower weights.

Such a weighting across multiple water components can thus, at least in principle, provide an axis of environmental benefit/disbenefit that can be developed in addition to the classical expression of value in human economic terms. Such a system could perhaps provide a resolution to the problem that only the human component can generally be expressed by classical economic valuation methods.[7] It would thus afford other axes for identifying good and bad effects in the ethical evaluation of potential actions.

I suggest that an integrated environmental metric, applicable across the whole spectrum of members and applications, could enable a balance of good/bad consequences to be established for the components of the non-human world. So, for example, it would be possible to evaluate the consequences for each component, normally positive for good benefits and negative for disbenefits, all placed on a common numerical range, say +1 to – 1. These benefits could then be weighted with a factor associated with the scarcity and importance of each impact recipient. The practical difficulties of doing so would be large, but could in principle be overcome.

This procedure would provide an environmental consequences metric in which the post-action state could be compared with the current, or the 'do nothing' state, or perhaps even against a theoretical 'natural' condition. Such a metric could then be placed against the standard cost-benefit analysis of the human consequences. The ethical decision then becomes more complex. No longer is it, *is this action cost-effective*? But rather, *does this action, bringing these environmental costs and benefits, justify this expenditure for the resulting human benefits*?

Such an evaluation system could be seen in part as a reaction to the fact that, in the past, the economic consequences had dominated the decision-making process. It thus suggests that any decision ought to be evaluated in terms of more than a single value (economic) system. This is perhaps a better reflection of the way human beings make decisions, by weighing up many different aspects, some objective, some qualitative, some personal, some aesthetic, and so on. Consequently, a new metric system, incorporating both economic and environmental elements, is suggested. Such a dual-axis system could potentially identify areas where the overall benefits are good both economically and environmentally, and where the overall benefits are bad. Where however they are contradictory, the evaluation has to be made either on the relative merits of the arguments, or alternatively by reference to yet another axis system, for example aesthetic consideration, hedonism, duty or religious inclination to enable a decision to be made.

[6] We leave aside the issues associated with the existence of evil, by assuming on the whole that ethical decisions are intended to be good. We may note the existence of evil, and in our religions, try to understand it (Hick, 1966), but this is not a requirement of a water ethic.

[7] This essay does not deny the introductory statement of Prescoli et al. (2004) that "water has an economic value" but asserts that this is not its only value, and that an economic analysis is, on its own, an incomplete assessment of human valuation.

This evaluation could be taken by any individual, whether a member of the public or a political decision maker. Any decision will be taken on an understanding of both human and non-human components of the balance, depending on the relative weights and importance of each decision maker.

RULES OF THUMB

Although such a system sounds fine in principle, it is impractical to apply it to every conceivable action. Human beings generally use rules of thumb by defining ethical norms, precedents, and generally accepted ways of acting.[8] In practice then, rules of thumb, generally accepted procedures, and codified past decisions develop to enable quick decisions in everyday life. What is important is to realize that these are just that, and not absolute rules that must be applied in each and every situation. It might however be possible to suggest a few examples that might perhaps serve as a starting point for a debate:

1. *Water is a common good that should be made available to all human beings, and to all landscape units and creatures if at all possible.*

It has been argued (e.g. by Gleick, 1999) that access to adequate water is a basic human right, as a consequence of the Universal Declaration of Human Rights and the right to health and happiness. This right would require access to adequate water at least for health (drinking water, hygiene and cooking) (Prescoli et al., 2004; Aureli and Brelet, 2004). A holistic viewpoint would extend this right to all creatures and environments. There are difficulties in defending such a definition of rights, on several grounds,[9] principally that of defining how the reciprocal transfer of rights and duties can be defined, and how non-rational, or even non-animal systems or individuals could possibly either exercise their rights, or reciprocate their half of the bargain. It is possible to see such rights as being given by the human community to the natural world, without any reciprocation involved. This however fails to address the question of what happens when some part of the human community rejects this benevolent attitude. Normally, this finds expression in the rules of society, both customs and laws, in which individuals or agencies speak and act on behalf of the non-human world. The only philosophical positions that can easily embrace this view are those that see the whole of the environment as having an independent value outside of humanity. This is easiest for the theistic viewpoint, which, seeing the environment as a creation of the same god as humanity, finds a responsibility to treat the creation as the work of the same creator god, that has similar, and no lesser, rights than the human component. However, no matter how we justify this principle, it soon becomes a central component of any water ethic. It acknowledges that access to water becomes essential for all life. Hence, it should be made available to all. This implies to human beings that they have to share their resources with the natural world, and also ensure that the natural world has enough for its own functioning – so rivers have to run, lakes have to be full. But when the supply is limited, then it will be impossible to meet all the competing needs. Here we need another rule.

[8] This can be seen in the theological debate over 'situation ethics' in the 1960s, which tried to identify a religious morality that moved away from a rigid rule book mentality (Fletcher, 1967).

[9] The issue of how to defend the Universal Declaration of Human Rights is based on its issue as a given, 'self-evident' truth. Such truths have an ex cathedra property, which makes them difficult to defend against the 'it's not evident to me' attack. It is even more difficult to see how the language rights (with its sub-text of parallel responsibilities) can be applied to the non-human world. (The many issues are discussed, for example, in the essays in Singer, 1991).

2. *Where there is competition between users of water, natural proportionalities should be maintained so far as possible, allowing for positive action to preserve endangered species and habitats.*

The 'rights' argument appears to place an absolute demand that all water needs are met but, frequently, this condition cannot be met, for example in natural systems during dry seasons. Where water shortages are natural seasonal phenomena, every effort should be made to ensure a balance between the demands of the component ecosystems and species that is as close to the natural balance as can be achieved. It should not, for example, be assumed that the human right to water should automatically override that of other species, particularly where human beings have the option of seasonal mobility or alternative water supply options.

The issue of allocation where there is a major shortage is more difficult. An ideal answer might be for human beings to withdraw and leave the natural systems to cope with the situation as best they did before the human influence, but this is no longer possible, as the current state of the climate is also affected by human actions. Because we have affected the global climate there is no longer any completely wild area, or area of untouched environment, so we have to manage our mistakes everywhere.

This places human beings in the position of having to manage environments, insofar as they are able. In doing so, they should at all times attempt to provide all the water needed for the continued well-being of all the components of the environment, both living and non-living. But making this allocation is difficult, and it is proposed here that the rough natural proportionalities should be a guide.

The problem arises when the supplies are inadequate to meet even human needs. Here the choice becomes stark: do we cut back human use of water in order to protect endangered wildlife? There is probably no easy general answer to this question, as so much depends on the context. Ideally, the human population should use its technological expertise to maintain its own supplies, leaving as much as possible for the wildlife systems – but this is not always possible where problems arise in disadvantaged societies.

3. *Uniqueness should be protected. Extinction is bad.*

Acknowledging that all interventions in the hydrological cycle have implications for the life of the planet, it is important that, so far as possible, the impact of each intervention should be examined for its impact on the surrounding environment and the associated ecosystems. Any water use should thus be planned to reduce the impact on the environment and, where possible, to preserve the maximum diversity and amount of non-human life. This aspiration has already been identified in Europe by a wide range of protection policies, designed to preserve biodiversity and protect both special habitat types and individual species. If, as is inevitable, interventions in the hydrological cycle adversely affect some parts of the environment, unique or rare habitats should be most protected and rare species given especial consideration. Perhaps, the ultimate environmental evil could then be identified, such as the extinction of a species, or the complete destruction of a habitat type.

4. *Wetlands are good, providing valuable processes, unique habitats and water-flow regulation.*

In the past, wetlands have had a bad press, and were considered either the locus of evil, or else waste areas ripe for conversion to productive land, and so of no value (Giblet, 1996; Maltby, 1986). Modern understanding of wetlands has moved away from such a view, and now seeks to preserve wetlands, both for the benefits provided to themselves (biodiversity, landscape, habitat), and for their utility (flood control, water processing, water balancing). For this reason, many nations have become signatories to the Ramsar Convention on the Protection of Wetlands. However, it is also possible to argue that wetlands, as a habitat and as an ecosystem, have an independent right to exist. As such, they

should not be deprived of the water required to maintain their existing functions and extents, or have larger burdens imposed on them (e.g. by the import of large quantities of polluted water).

5. *Water bodies should be kept as close to natural conditions as possible, and protected from overexploitation and contamination.*

The European Water Framework Directive (EU, 2000) develops a list of target conditions for all types of water bodies. For most of these, the aim is to achieve the best possible status, which is the undisturbed condition as near as possible. For many water bodies, this cannot be achieved, and realistic aims have to be evolved that acknowledge the presence of human beings in the catchment, and their continued use of the water bodies as means of transport, amenity, landscape, and water supply. We need to derive measures to allow for the identification and preservation of both the essential ecological functioning of rivers and their continued use by the human beings who have located themselves (quite deliberately) on their banks.

6. *Prudent storage of water is generally a good thing if the storage does not destroy important habitats.*

In general, schemes to conserve water are more beneficial than detrimental, particularly if used to maintain the life of both human and natural systems in times of drought. They have the additional advantage of providing large inland water habitats that are often quite rare in the landscape. However, care should be taken in the implementation of major dam projects, because many of these have adverse effects on the wider environment and the societies around them, and in particular on the regulated rivers downstream.

7. *We should plan to prevent extreme events – floods and droughts – from having bad impacts on both human and non-human systems.*

Floods have particularly large impacts on human occupation close to the rivers. Human habitation is often close to rivers for the many advantages (economic and transport) they bring; and on flood plains for the rich agricultural land they afford. Consequently, it is necessary to protect the human inhabitants of both flood plains and locations adjacent to rivers. However, the overreliance on 'hard-engineering' solutions that has characterized the last 100 years, needs to be balanced by more naturalistic 'soft-engineering' solutions.

However, it is also important for us to recognize that floods are natural events having an important impact on both landscapes and ecosystems.

There is thus a need to balance the need of natural systems with the human needs. Human beings need to learn to live with floods, probably by a mixture of appropriate land use choices (living, if possible, away from flood zones); protection of key sites (such as the use of flood banks to protect cities and key infrastructural sites); and periodic evacuation (requiring appropriate flood-warning systems).

8. *Rivers and river systems should be left to function as closely as possible to their original state, so maintaining material flux through the hydrosystem.*

It is however impossible to restore a completely natural state for many water bodies, particularly those in rapidly evolving landscapes, and where the landscape has been heavily modified by human activity. Perhaps, a natural state is best defined as a state that we think best defends the ecological and hydrological functioning of the system, rather than an attempt to return to some supposedly prehuman historical state.

9. *Social justice should attempt to remedy the disadvantage of groups and ecosystems due to poor water management.*

Ecological justice requires that all water use decisions should seek to remedy the impacts of previous decisions on endangered species or ecosystems. However, this will probably never be achieved in practice while major social justices remain. Consequently, the resolution of environmental problems can never be separated from the lives of those people who live in the area concerned, often requiring particular emphasis on the role and place of women (Aureli and Brelet, 2004). This involves the adoption of a holistic viewpoint, rather than the technological view which would separate the various functions and pass the identification of solutions to groups who are subject-limited experts – hydrologists on the one hand and sociologists on the other. A preferable solution is always to involve the local inhabitants in the resolution of problems in a way that meets the needs and aspirations of both themselves and the environment. Frequently, local peoples are more involved with the continued functioning of water-dependent systems than the high-level planners, economists, and engineers who attempt to provide 'solutions' in terms of major projects. More often, what is need is grass-roots level action, facilitated among the people of the places involved.

10. *Water use decisions should include all human participants, and in public decisions should include additional representation for those who speak for the natural world.*

In most of the modern world, decisions on the future of the environment are made in public consultations, or political debates. In most of these, the standard process is to bring in groups of technical experts to sort out technical issues. Normally, there is no one in these debates to speak directly for the environment. Partly this is just the reflection that the inanimate landscape cannot itself directly participate in these debates, and partly because of the technological mindset of governments and planners. It is thus essential, that in all debates, there are those who speak on behalf of the environment, just as much as there are those whose function is to represent local peoples. Human care for the environment should extend to the act of speaking out for it in such debates.[10]

CONCLUSIONS

There can be no conclusion, only a summary of the current position in the continuous struggle of human beings to adopt ethical positions, to balance their needs with those of the world. The only conclusion to this process is the end of the human race or the end of the natural world, neither of which is acceptable to our current way of thinking. However, we can move towards to some general ideas that summarize the arguments so far:

Water is more than just a commodity, so echoing the European Water Directive (EU, 2000), it is essential to life, and the functioning of ecosystems and landscape systems. Ethical water management is thus not just about the allocation of water resources to human beings, but to all species, and to all landscape components.

In asserting that water is not just a commodity, we imply that an economic evaluation is not the sole arbiter of the issues of water management. A second axis in decision making, that of environmental impact, is suggested, so reflecting the fact that human decision making is frequently multidimensional, and ethical water management needs to take into account all the dimensions, not just the monetary aspect.

In caring for water we are caring for life, all life, for the whole earth system. By making water a focus of our considerations, we enable a practical realization of at least the spirit of Leopold's land ethic that has been the inspiration to so many.

[10] This ethic is a practical example of the working out of the Christian 'bias to the poor', extended to the non-human world which can be seen as the least powerful component of the human world (see, e.g. McFague, 1997).

REFERENCES

Armstrong, A.C. 2006. Ethical issues in water use and sustainability. *Area* 38(1): 9-15.

Armstrong, A.C. 2007. Towards a water ethic. In Robinson, P.J.; Jones, T. and Woo, K.-K. (Eds), *Managing water resources in a changing physical and social environment,* pp. 7-15. Rome: Societa Geografica Italiana.

Attfield, R. 2003. *Environmental ethics*. Cambridge: Polity Press.

Aureli, A. and Brelet, C. 2004. *Water and ethics. Women and water: An ethical issue.* UNESCO, Series on Water and Ethics, No. 4. Paris: United Nations Educational Scientific and Cultural Organisation (UNESCO).

Callicott, J.B. 1989. *In defence of the land ethic: Essays in environmental philosophy.* Albany: State University of New York Press.

Callicott, J.B. 1999. *Beyond the land ethic: More essays in environmental philosophy.* Albany: State University of New York Press.

Dryzek, J.S. 1997. *The politics of the earth: Environmental discourses*. Oxford: Oxford University Press.

EU (European Union). 2000. *Directive 2000/60 of the European Parliament and of the Council of 23 October 2000 establishing a framework for community action in the field of water policy.* Luxembourg: European Union.

Fletcher, J. 1967. *Moral responsibility: Situations ethics at work.* London: SCM Press.

Giblet, R.J. 1996. *Postmodern wetlands: Culture, history, ecology*. Edinburgh: Edinburgh University Press.

Gleick, P. 1999. The human right to water. *Water Policy* 1(5): 487-503.

Hick, J. 1966. *Evil and the god of love*. London: Macmillan.

Jamieson, D. (Ed). 2001. A companion to environmental philosophy. Oxford: Blackwell.

Khalid, F.M. and O'Brien, J. (Eds). 1992. *Islam and ecology*. London: Published for WWF by Cassell Publishers.

Leopold, A. 1949. *A sand county almanac, and sketches here and there*. Special Commemorative edition, with an introduction by Robert Finch. Oxford: Oxford University Press.

Maltby, E. 1986. *Waterlogged wealth.* London: Earthscan Publications.

McFague, S. 1997. *Super, natural Christians*. London: SCM Press.

Palmer, C. 1997. *Environmental ethics*. Santa Barbara: Denver and Oxford: ABC-CLIO.

Prescoli, J.D.; Dooge, J. and Llamas, R. 2004. *Water and ethics: Overview.* UNESCO, Series on Water and Ethics, No. 1. Paris: UNESCO.

Schama, S. 1996. *Landscape and memory*. London: Fontana Press.

Singer, P. (Ed). 1991. *A companion to ethics*. Oxford: Blackwell.

White, L. 1967. The historical roots of our ecological crisis. *Science* 155: 1203-7.