THE PRINCIPLES OF ECOLOGICAL MANAGEMENT

OWEN MOUNTFORD[1]

Summary.
As with all the natural sciences, ecology seeks to be both objective and rigorous in its approach. However, in common with all human activities, the language of ecology is invested with assumptions and laden with theory. Such factors mean that an apparently simple description of an ecological approach may have different imports for the ecologist and non-ecologist and indeed for different generations or varieties of ecologist. In addition, the science of ecology has been confounded over many decades with an "environmentalist" or "green" philosophy. In designing management schemes, ecologists frequently are motivated by a wish to ensure the future of biodiversity, but this is not perforce the case.

This paper seeks to describe how ecologists approach management of habitats, using examples drawn from wetlands, and especially from within the Somerset Levels and Moors in southwest Britain. Those world-pictures that determine concepts such as "natural", "community" and "sustainable" are discussed, with particular reference to the historical change from preservation, through conservation to ecological restoration. Some account is taken of both purely mechanistic and organismal approaches, the latter drawing on philosophical and historical parallels between ecology and psychology, especially in terms of balance and disturbance. The paper concludes with an attempt to summarise the value-systems that ecologists bring to bear in influencing policy and management decisions.

Ecology: science, philosophy and language

It is increasingly commonplace for both European legislation, and indeed worldwide environmental treaties, to be couched in terms of ecology. For example central themes of the EU Water Framework Directive (2000/60/EC), are the concepts of "good ecological status" and "river basin management". In particular, good ecological status is defined in terms of the "*…….quality of the biological community……..*" with acknowledgement that "*….no absolute standards …….. can be set that apply across the Community, because of ecological variability……..".* Moss (2001) believed that this directive was the first piece of European legislation to take a remotely comprehensive view of the environment, affecting nature conservation and ecological quality – note his separation of the two aspects.

Confusing method and motive: ecology and the protection of biodiversity

More than with many sciences, ecology has had to struggle to be recognised as both objective and rigorous in its approach. Popular and, crucially, both political and media perceptions routinely confound the science of ecology with some loosely-focussed "green" philosophy (*e.g.* Mitchell 1976). Hence, in the context of environmental policy, ecologists try to be painstakingly precise and dispassionate. When applying ecological principles to wetland management and restoration, ecologists will frequently be stimulated by a wish to ensure the future of biodiversity, just as a medical scientist will normally be motivated by wanting to improve human health and longevity. However, here is no exact correspondence between ecology and environmentalism (Calow 1998), and the valuable contributions that ecologists can make may be discounted if other stakeholders feel that the ecologist has an overriding "green" agenda to pursue. Regrettably, even the finest ecologists will very often talk about "ecological interest" (*e.g.* Sutherland 1995), when they really mean "nature conservation interest", as though there were something inherently more interesting to the ecological scientist in a species-rich and diverse habitat, than in one that due to "natural" or anthropogenic factors is species-poor and uniform. This standard distinction between natural and anthropogenic factors is considered by some people to be entirely arbitrary, maintaining instead that human beings are "of nature".

Underlying principles of ecological management

Ecological language is theory-laden and the concepts of the science are perforce endowed with assumptions, such that an ecologist and non-ecologist may understand very different things from the same statement. Sutherland (1995) and Keddy (2000) provide clear synopses of how ecological principles might affect the design of habitat management. However, they warn that for a particular site scheme, theoretical science may be less influential than the imperatives of cost, land ownership and chance historical events or of informed practical experience. Secondly, it is admitted that how an ecological principle affects the choice and design

[1] CEH, Monks Wood, Abbots Ripton, Huntingdon, Cambridge, PE17 2LS

of management regime will be hugely influenced by the ethical, philosophical and socio-economic factors – what is one trying to achieve and why?

Despite these *caveats*, application of Sutherland's principles to wetland management can be summarised as below, and attempts have been made to derive systems of management prescriptions for wetland habitats from such principles (*e.g.* Mountford in press):

1. **Communities & ecosystems**: To paraphrase Whittaker (1975), natural communities are assemblages of populations of plants, animals and microbes that interact with one another, forming together a characteristic living system with its own composition, structure, environmental relations, development, and function. In turn, this living system interacts with the environment, being affected by climate and soil, and in turn affecting the soil and its microclimate. Thus an ecosystem comprises the community and its environment, treated as a functional system of complementary relationships. The wetland manager must have regard for such interactions between species, and between species and their environment in conceiving, adapting and applying a plan.

2. **Succession & disturbance**: In effect "directional change in vegetation", succession describes the processes whereby one community changes into another *e.g.* in the encroachment of reeds into a pool, with time altering a site from aquatic to terrestrial. Growth and activity of each colonising species alters site conditions, leading to gradual replacement of one assemblage by another. Communities may be kept at an early or intermediate successional stage by disturbance *e.g*. regular flooding (Keddy 2000). Nature conservation may value these early stages or seek to maintain a range of stages to ensure diversity of species. Hence managers may have to intervene (disturb) to prevent succession proceeding to its climax.

3. **Competition** is defined as negative (detrimental) interaction between species (Calow 1998) brought about by their need for a common resource *e.g.* light, water or prey. Such competition has led to species acquiring particular specialisations that enable them to compete successfully in certain situations (niches). An outcome of competition may thus be a diversity of species exploiting variation in the environment and the wetland manager may want either to ensure that such variation is maintained, or control the activity of a particular competitive species to ensure the survival of other species.

4. **Grazing, mowing & predation**: Grazing and predation represent examples of those natural interactions that shape a community and its function. To some extent, mowing is a comparable human activity. The importance of all three to the wetland manager lies in how they may be employed to, for example, alter the species balance though selective grazing or predation, create "regeneration niches" within which species may reproduce and establish or change the physical structure of the habitat to suit some particular target species (*e.g*. Benstead *et al*. 1997).

5. **Fertility**: The nature of a community and its composition is determined by the site fertility, whether that be natural or influenced by artificial nutrient inputs. Marrs (1993) concluded that species diversity was reduced whenever fertilisers were applied to an ecosystem that was relatively species-rich, but that in very species-poor communities, such application could actually increase species diversity. Following both agricultural intensification and increased nitrogen deposition from atmospheric pollution, sites often have greater fertility with consequent changes in community composition (Mountford *et al.* 1993) and soil processes (Morecroft *et al*. 1994).

6. **Life histories**: When adopting a particular method of wetland management, the outcome can be markedly affected by the timing of its application. Thus flooding a wet grassland into the growing season can alter the botanical composition (Gowing 1996), whilst mowing or grazing at critical times may reduce breeding success in birds or seed-set (Benstead *et al.* 1997). Design of a management regime should take into account knowledge of the life histories of the species in a habitat, especially those that are either central to ecosystem function or "valued".

7. **Dispersal**: Species vary greatly in their ability to cross any distance that separates the place they occur from another area of suitable habitat. Flying insects, birds and windborne seed may be

effective, but in contrast the perennial clonal plants that dominate many wetlands may disperse almost entirely vegetatively, and are unable to pass barriers of unsuitable habitat (Bullock *et al.* 2002). Wetland managers may therefore consider actions that circumvent these barriers, either by destroying the obstruction or by moving the desired species itself.

8. **Patches & mosaics**: Whereas the wetland manager might normally act at the scale of a single patch of reedbed, lake or field, some species function in terms of a group of patches, or more precisely as a population of populations (a metapopulation). Thus, where a species becomes extinct in a disjunct patch of habitat, it may be adapted to re-colonising the site from other adjacent patches. Effective management for such species and the community they characterise may have to have regard to the distribution and linkage of such patches.

9. **Structure**: Biological diversity often depends on the structural diversity of a wetland *e.g.* layering of vegetation, the presence of micro-topographical variation and, not least, features such as fallen trees and poached mud (Sutherland 1995). In an attempt to be perceived as "good at their job", at one time some nature reserve managers sought to achieve a "tidy" site with clear demarcation between areas of water, herbaceous vegetation and scrub or woodland. Increasingly, it is realised that unkempt and transitional zones may support distinctive species assemblages or play a role in the overall functioning of the habitat.

10. **Interaction with hydrology**: Finally, consideration of wetland management must focus on hydrology. In terms of ecological principles, water may simply be a key environmental factor to be considered in managing the ecosystem and its network of complementary relationships referred to earlier. Although wetlands develop because there is water, the wetland type and its character will depend on much more than water (Keddy 2000). Nonetheless the linking role of water in wetlands has led to the development of hydro-ecology as an integrated discipline, with application to all aspects outlined above. For example, spatial factors such as dispersal and patch distribution interact with hydrology. Many wetlands are influenced by hydrological processes that may operate at a catchment scale, such as riverine flooding and groundwater discharge (Acreman 2003), and the manager should consider rainfall and pollution at points far removed from the site for which they are responsible.

Ecological principles in the design of wetland restoration

Whereas for much of the 20th century writers spoke of protection and heritage, of reserves and scientific interest, and especially of careful control of nature, recent thinking has begun to review this legacy critically (Adams and Mulligan 2003). Research ecologists have also debated these issues. Far from abandoning the controlled managed approach, some like Westhoff (1971) endorsed more intervention, stating that nature conservation must not only maintain but also increase environmental variety, and that the belief that nature should look after itself was "outdated".

Others were conscious that nature conservation, especially in northwest Europe, had often amounted to little more than a rearguard action that won "some minor battles whilst steadily losing the war" (Ratcliffe 1981). The manner in which ecology is applied to the protection of biodiversity has consequently altered over the decades, from a focus on preservation to one of ecological restoration (Sheail *et al.* 1997). The last quarter of the 20th century saw the rapid evolution of ecological restoration, pioneered by Bradshaw (1983, 1997) and seeing fruition in the founding of the *Society for Ecological Restoration*. Some expressions of the main tenets of ecological restoration challenge the scientist, or might even appeal to their self-esteem *e.g.* "*….successful reconstruction of ecosystems, when it is achieved, has the reward that it is the ultimate proof of our ecological understanding*" (Bradshaw 1983). Do ecologists really know what they are talking about?

Ecological restoration embraces those ecological principles already outlined, but often in a more proactive manner or certainly less acquiescent to the long-term gradual deterioration of biodiversity and perceived nature conservation value. Increasingly such activity is seen in a broader context that addresses the needs of wildlife, people and socio-economic activity. This more holistic approach has been shown in some ambitious restoration schemes, especially for wetlands (Colston 2003). In applying ecological principles, those attempting wetland restoration set themselves certain measures of success that also derive from ecological theory (Cairns 1998; Ewel 1987):

- **Composition:** Does the restored habitat have the same dominant species and similar physiognomy? This may be criticised as a rather superficial measure.
- **Sustainability**: Is the restored community capable of perpetuating itself, or does it require management *i.e.* human intervention?
- **Invasibility:** Does the restored community resist invasions by new species?
- **Productivity:** Is net ecosystem productivity similar to that of the target ("natural") community that the manager is seeking to re-create?
- **Nutrient retention:** If the restored community loses greater amounts of nutrients than the target, then it may be thought of as a "defective imitation".
- **Biotic interactions:** Measures that refer to the right botanical composition may be relatively readily met, but what about the associated fauna and microbial activity – has the restored community achieved the complex interactions that demonstrate functional integrity?

Summing up such measures of success, and effectively defining how ecological principles should be applied to both the management and restoration, Bradshaw (1997) stated that "*the ultimate goal of ecological restoration is an ecosystem whose structure, functioning and sustainability are akin to those of a (semi-)natural community, with each element in place, and evolved to a level comparable to that of the target ecosystem*" (Figure 1).

Habitat health, disturbance and balance: parallels in psychology

Yet, despite such honourable attempts to rigorously codify the principles of ecology as used in wetland management and to make of it an entirely objective mechanistic discipline, there is no escaping the way in which human perception and altered paradigms colour the understanding and application of ecology. What ecologists mean and what they want are neither necessarily transparent nor dispassionate.

Some understanding of changing attitudes to habitats and to the application of ecological principles are seen in the life of a founder of ecology as a science and the man who coined the term "ecosystem", A.G. Tansley (Cameron 1999). Tansley's contemporary Clements had conceived of communities as comparable with a "complex organism", and discussed "natural" habitats (wilderness) as occurring in isolation from human activity. Such super-organism approaches find more modern resonance in the Gaia hypothesis (Lovelock 1979).

Though Tansley was indeed influenced by this organismal concept, he was also deeply involved in the growth of psychology, and tended to find more parallels between human and "natural" life than did Clements. Hence, he talked rather of the community as a "quasi-organism" and studied equilibrium, disturbance and balance in vegetation, with echoes to psychoanalytic methodology. Working in a country shaped by centuries of human activity, with little or no wilderness, Tansley identified essentially similar processes at work in the "natural/normal" wildness and in the disturbed and degraded habitat typical of the British wetlands. Consequently, Tansley came to be rather critical of the preservationist (zero intervention) approach, regarding it as negligent. Instead, together with Harry Godwin, he stressed the "scientific interest" of wetlands, and advanced the cause of ecologists as nature's managers and as its trustworthy analysts (Cameron 1999).

What do ecologists want? Value systems in ecology.

In the early 21st century, it might be facile to make a strong distinction between the managers of habitats who intervene (even as "gardeners") in habitats to achieve particular ends, and those who apparently advocate a more "hands-off" approach. It is still possible, however, to perceive some difference in the philosophy of nature protection between western Europe and eastern Europe (with North America), contrasting the "semi-natural" with wilderness. To a great extent, such differences in approach and in terminology reflect the land-use history and present "natural capital" extant in the two areas (*e.g.* Borza and Pop 1930). The present ecological paradigm talks of unpredictability and of chaos, of open systems and doubt. Ecologists now approach wetland management conscious that the object of their attention is "messy, contingent and uncertain" (Cameron 1999). Although this philosophy has more in common with Tansley's interest in disturbance than in the normalcy of Clements, it gains from both a respect for nature and a feeling of responsibility to intervene judiciously where damage is perceived.

"*Biodiversity is not the recipe found in a book, it is the many dishes that can be made from it; not the musical score but the multifarious performances*" (Rodwell 2003). Application of ecological principles to wetland management will not deliver the same result every time. The policy-maker or habitat-manager should not want an entirely predictable result, nor is biodiversity itself thus best served.

References

Acreman, M.C. (2003). Hydrology of wetlands. Paper presented at the ESF workshop on *Examples of Environmental Policy in the Management of Wetlands* at Wells, UK, 28-29 August 2003

Adams, W.M. & Mulligan, M. (2003). *Decolonising Nature: strategies for nature conservation in a post-colonial era.* London: Earthscan.

Benstead, P., Drake, M., José, P.V., Mountford, J.O., Newbold, C. & Treweek., J (1997) *The Wet Grassland Guide.* Sandy: Royal Society for the Protection of Birds

Borza, A. and Pop, E. (1930). Report presented 18th-21st April 1928, published in "*The First National Congress of Romanian Naturalists*". Cluj-Napoca: Science Society of Cluj.

Bradshaw, A.D. (1983). The reconstruction of ecosystems. *Journal of Applied Ecology*, **20**: 1-18.

Bradshaw, A.D. (1997). What do we mean by restoration? In: Urbanska, K.M., Webb, N.R. & Edwards, P.J. (Eds) *Restoration ecology and sustainable development*. Cambridge: Cambridge University Press

Bullock, J.M., Kenward, R.E. & Hails, R.S. (2002). *Dispersal Ecology. (42nd Symposium of the British Ecological Society*. Oxford: Blackwell.

Cairns, J. (1988). *Rehabilitating Damaged Ecosystems*. Boca Raton: CRC Press

Calow, P. (1998). *The Encyclopaedia of Ecology and Environmental Management.* Oxford: Blackwell

Cameron, L. (1999). Histories of disturbance. *Radical History Review*, **74(4)**: 4-24

Colston, A. (2003). Beyond preservation: the challenge of ecological restoration. In: Adams, W.M. & Mulligan, M. (ed). *Decolonising Nature: strategies for nature conservation in a post-colonial era.* London: Earthscan.

Ewel, J.J. (1987). Restoration is the ultimate test of ecological theory. In: Jordan, W.R, Gilpin, M.E. and Aber, J.D. (eds) *Restoration Ecology: a synthetic approach to ecological research,* pp 31-33. Cambridge: Cambridge University Press.

Gowing, D.J.G. (1996). *Examination of the potential impacts of alternative management regimes in the Somerset Levels and Moors ESA.* Report to the Ministry of Agriculture. Silsoe College.

Keddy, P.A. (2000). *Wetland Ecology: Principles and Conservation.* Cambridge: Cambridge University Press.

Lovelock, J. E. (1979). *Gaia: a New Look at Life on Earth*. Oxford: Oxford University Press

Marrs, R.H. (1993). Soil fertility and nature conservation in Europe: theoretical considerations and practical management solutions. *Advances in Ecological Research*, **24**, 241-300.

Mitchell, J. (1976). Song for Sharon. In: Mitchell, J. *Hejira.* Asylum Records

Morecroft, M.D., Sellers, E.K. and Lee, J.A. (1994). An experimental investigation into the effects of atmospheric deposition on two semi-natural grasslands. Journal of Ecology 82: 475-483.

Moss, B. (2001). Words and water. *Bulletin of the British Ecological Society*, **32(2)**, 18-19

Mountford, J.O. (ed) (In press) *Guidelines for the management and restoration of lowland wet grassland*. London: Department for Environment, Food and Rural Affairs.

Mountford, J.O., Lakhani, K.H. & Kirkham, F.W. 1993. Experimental assessment of the effects of nitrogen addition under hay-cutting and aftermath grazing on the vegetation of meadows on a Somerset peat moor. *J.Appl.Ecol.*, **30**, 321-332.

Ratcliffe, D.A. (1981). Concluding remarks. In: Duffey, E.A.G. (ed.)*Habitat Restoration and Reconstruction.* Huntingdon: Recreation Ecology Research Group

Rodwell, J.S. (2003). Human relationships with the natural world: an historical perspective. *Ecos*, **24(1)**, 10-16

Sheail, J., Treweek, J.R. and Mountford, J.O. (1997). The UK transition from nature conservation to "creative conservation". *Environmental Conservation,* **24**, 224-235

Sutherland, W.J. (1995). Introduction and the principles of ecological management. In: Sutherland, W.J. & Hill, D.A. (Eds) *Managing habitats for conservation.* Cambridge: Cambridge University Press.

Westhoff, V. (1971). The dynamic structure of plant communities in relation to the objectives of conservation. In: Duffey, E. & Watt, A.S. (ed). *The Scientific Management of Animal and Plant communities for Conservation (11th Symposium of the British Ecological Society).* Oxford: Blackwell

Whittaker, R. (1975). *Communities and Ecosystems*. New York: MacMillan

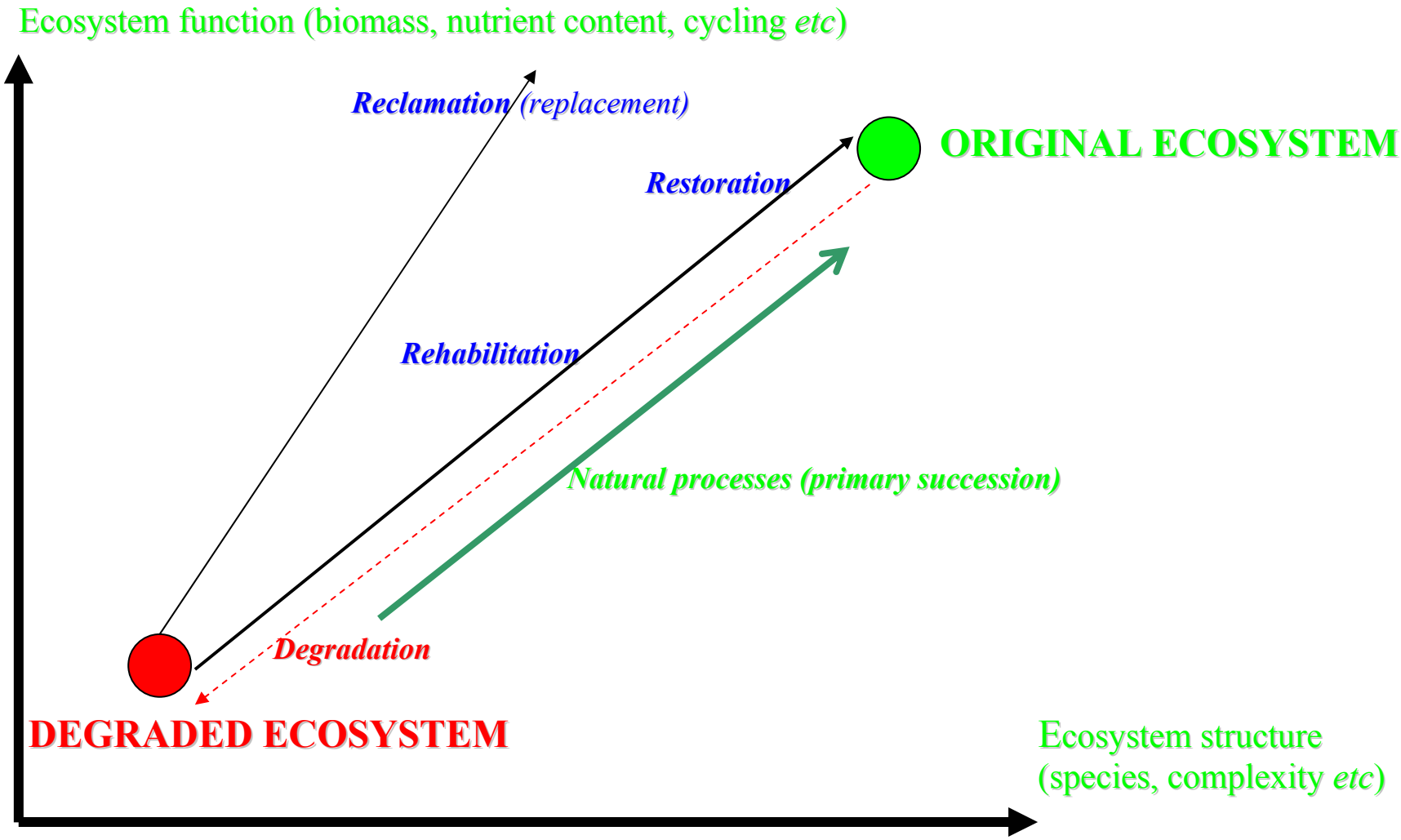


Figure 1: **Different options for the improvement of a degraded ecosystem (Expressed in terms of the two major characteristics of structure and function) [after Bradshaw 1997]**

HYDROLOGY OF WETLANDS

Mike Acreman[1]

Summary
It is the presence of water for some significant period of time that creates the soils, its micro-organisms and the plants and animal communities such that wetlands function in a different way from fully aquatic or dryland habitats. Mitch and Gosselink (1993) highlighted the fact that 'hydrology is probably the single most important determinant for the establishment and maintenance of specific types of wetlands and wetland processes … when hydrologic conditions in the wetland change even slightly, the biota may respond with massive change in species richness and ecosystem productivity."

This talk presents three examples of issues in wetland hydrology: hydrological functions, hydrological impacts and wetland water management.

Hydrological functions
Open any book on wetlands conservation and it will encourage you to maintain wetlands partly because of their role in the hydrological cycle. Wetlands are said to perform "hydrological functions", such as flood reduction, groundwater recharge, low flow augmentation and water quality improvement. In particular, wetlands are reported to "act like a sponge", soaking-up water during wet periods and releasing it during dry periods, and they have been described as "*the kidneys of the landscape*". It is evident that such hydrological functions would be of benefit to flood reduction and water resource managers.

Studies as part of the European Commission project called the Wise Use of floodplains (Acreman et al, 2003) demonstrated that embanking the river Cherwell, thus isolating its floodplain wetlands from the river channel, increases peak flows by 50-150% (Figure 1).

However, it would be untrue to assume that all wetlands perform all hydrological functions all of the time. Indeed some wetlands may perform opposite functions. For example, basic hydro-geomorphological knowledge (eg. Hewlett and Hibbert, 1967) refers to saturated head water river margins (a type of wetland) as contributing, or runoff generating areas (Figure 2). These wetlands generate floods.

Hydrological impacts on wetlands
Many of man's activities can impact on the wetland ecosystem, including abstraction of water from rivers or aquifers, operation of weirs and sluices, building of embankments and dams. Under the EU Habitats Directive, such impacts on designated sites need to be assessed. Impact assessment on groundwater fed wetlands is particularly difficult since the relationships between surface water, shallow groundwater and deep groundwater are complex and difficult to quantify.

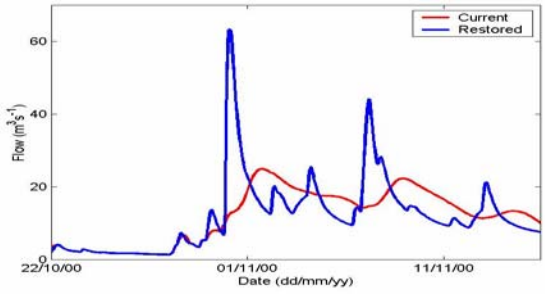


Figure 1 Hydrological impacts of separating by embankments, the River Cherwell from its floodplain wetlands

[1] Centre for Ecology and Hydrology, Wallingford, OX10 8BB

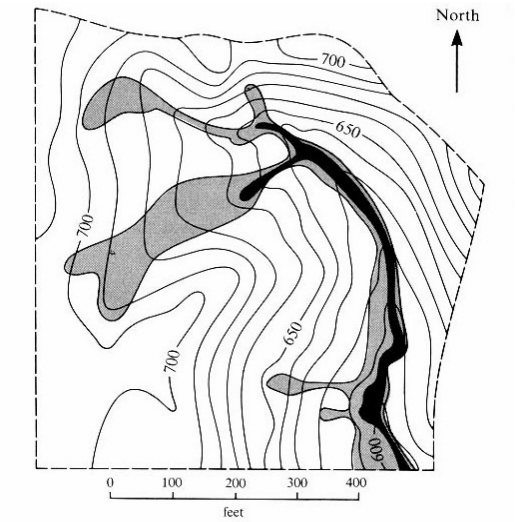


Figure 2 Saturated marginal upstream wetlands act as "contributing" areas of runoff generation

For example, the Breckland Meres are superficially similar endorheic base-rich wetlands in eastern England (Figure 3). Langmere is in direct hydrological continuity with the underlying Chalk aquifer and its regime is controlled by groundwater level. Ringmere has a less well developed connection with the Chalk due to lining of organic matter but is still largely controlled by groundwater. In contrast, Fenmere is separated from the underlying Chalk by clay alluvium and its water level is largely a reflection of the balance between rainfall and evaporation (Acreman and Jose, 2000).

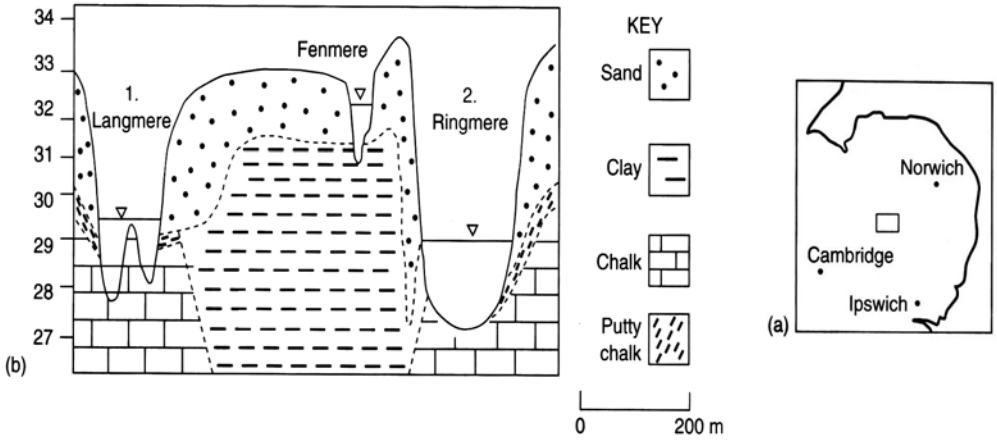


Figure 3. Three "similar" wetlands in East Anglia: Langmere - hydrologically connected to groundwater; Ringmere - some connection; Fenmere – isolated from groundwater

The World Commission on Dams concluded that provision should be made in new, and where possible existing, dams to make managed flood releases to restore and maintain downstream wetlands that had been impact by dam construction.

Wetland water management

In many wetland water levels in ditches are maintained for the conservation of specific animal and plant communities. The effectiveness of ditch water level management depends on the permeability of the soil. Even in peat soils water may not permeate very rapid from the ditches. Figure 4 shows recorded (dots) and modelled (lines) water table level transects across a wetland (Tadham Moor, Somerset) between two ditches. In the winter (red dots and lines) the water table is higher in the centre of the field due to rainfall and low evaporation, the ditches are acting as drains. In the summer

(purple dots and lines) the situation is reverse with the hydrological gradient towards the field centre where water table is lower due to high evaporation. In the spring, the field and ditch levels were in equilibrium.

The permeability of the soil can be determined by laboratory tests. However, sometimes these results can give misleading results, since the permeability of the wetland is actually controlled by macro-pores within the soil that are not represented in the sample tested (Figure 5).

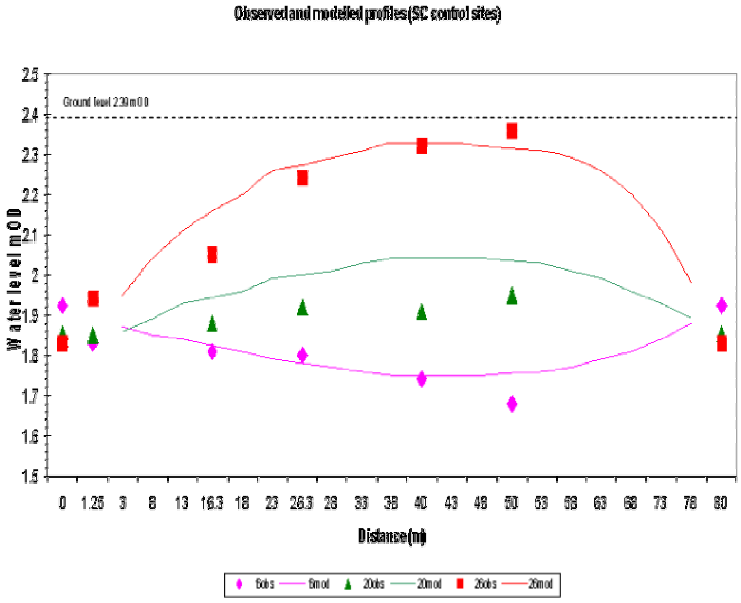


Figure 4 Water table levels along a transect between ditches for three periods when ditch levels similar (Winter – red; Spring – green; Summer – purple).

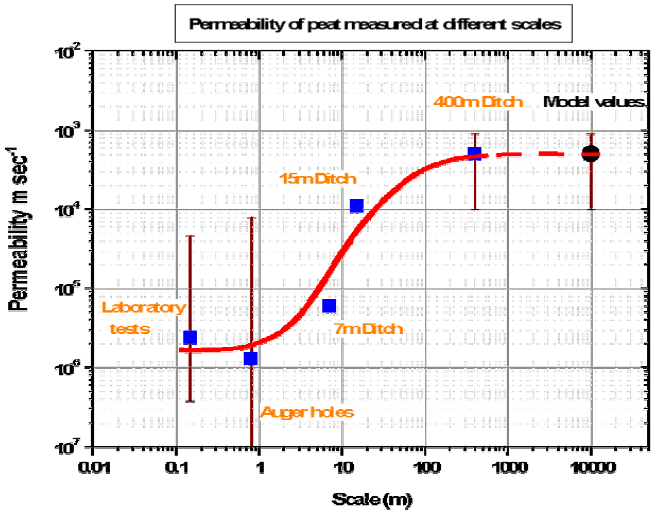


Figure 5. Lab tests may give lower permeability than field measurements due to macro-pores

Restoration of wetlands where soils have low permeability may be achieved by re-instating surface channels ("grips") that are connected to the ditches and deliver water directly to the centre of fields.

Acreman, M.C., Booker, D.J., Riddington, R. 2003 Hydrological impacts of floodplain restoration: a case study of the river Cherwell, UK. *Hydrology and Earth System Sciences*. 7,1, 75-86

Acreman, M.C., & José, P. 2000 Wetlands. In: Acreman, M.C. (Ed) *The Hydrology of the UK – a study of change.* Routledge, London.

Hewlett and Hibbert, A.R. (1967) Factors affecting the response of small watersheds to precipitation in humid regions. In: Sopper, W.E. Lull, H.W. (eds) *Forest Hydrology*, Pergamon Press, Oxford.

Mitsch W.J., Gosselink, J.G. (1993) *Wetlands*. 2nd Edition, Nostrand Reinhold, New York.

AN INTRODUCTION TO ENVIRONMENTAL ETHICS

ROBIN ATTFIELD[1]

1. Why care about environmental problems?

What makes problems like pollution, biodiversity-loss, salination and desertification environmental problems, and why should we be concerned about them? An answer to the first question is that they involve costs or harms or evils resulting from human transactions with nature, but costs that could either be avoided or ameliorated. Carbon dioxide emissions, for example, cannot be eliminated as long as humans live and breathe, but could be markedly reduced in ways that would affect global warming and rising sea-levels. But before the second question can be answered, it is worth noticing that the answer depends on different theories of value. And this already gets us to the core of what environmental ethicists investigate.

Some say that all we should be concerned about are human interests (what is called an 'anthropocentric approach'), and short term ones at that, interests such as those of this and the next two decades. Approaches that exclude the interests of the further future as well as those of non-human species are sometimes called 'shallow' approaches. Short-term human interests matter, and already explain why certain kinds of pollution should be avoided, but they are arguably not the only interests that matter. Think of toxic chemicals that pose little danger for the near future, but great danger to future generations living when their containers eventually corrode and release them; the approaches just mentioned would have no problem with waste-disposal of this kind, and yet it might cause death and disease in the long run. There seems to be a responsibility to the future not to let this happen. I hope to return to future-related responsibilities shortly.

This suggests that future interests matter, and also that they matter as much as current interests to the extent that they are foreseeable. Because we can now foresee a long way into the future, particularly in cases of radioactive substances, this means that at least sometimes the interests of the distant future should be taken into account. Approaches that take such a long-term view seem more enlightened than shallow approaches, because they recognise as problematic activities that could cause delayed damage to the distant future as well as ones likely to bring harm to the near future. But they are still often anthropocentric. Is this a drawback, and does disregard of non-human interests make any difference?

The difference made by different value-perspectives has already been illustrated; some kinds of pollution are not problems from short-term perspectives but can be major problems from long-term perspectives. What kind of difference could be made by the inclusion or exclusion of non-human interests in matters of pollution or of preservation?

Human interests might be thought to bring within the sphere of environmental concern everything that humans care about. But this fails to cover undiscovered species, since few people are likely to care about something they do not know to exist. Besides, even where creatures are known and in our charge, that does not make our own feelings the only basis for preserving them from harm and pollution. Animal suffering, for example, is widely recognised to count in itself, and not in proportion to how many humans are protesting about it. Species that are not capable of suffering pain or distress are not covered by this consideration, but their own good can be held to matter, as well as our own and that of sentient species. Accordingly some rapid answers to the questions about the difference made by the inclusion of non-human interests are that more kinds of pollution count as environmental problems, and more kinds of preservation are likely to be called for to avert such problems. Thus a big difference is made depending on whether we adopt a humans-only (anthropocentric) perspective or a biocentric (all-creatures-considered) approach. If so, some kind of value-theory seems to be needed that locates value in non-human lives as well as in human lives. Some defenders of anthropocentrism have replies to this, claiming that whatever affects ecosystems affects human beings, and that therefore considering human interests is sufficient. I find this reasoning unimpressive, partly because the conclusion does not follow, and partly because the premise is too vague to support it.

By now, we implicitly have an answer to the question posed at the start, of why should we be concerned about environmental problems, and this answer can now be made explicit. We should be concerned because of future as well as of present interests, and because of non-human interests as well as of the interests of humans. This

[1] School of English, Communication and Philosophy, Cardiff University, Humanities Building, PO Box 94, Colum Drive, Cardiff, CF10 3XB

allows me to return to the postponed issue of the nature and extent of responsibilities with regard to the future and to nonhuman species. I have a chapter on this in a forthcoming book,[1] and would like just to summarise some conclusions.

2. Some related responsibilities

Current responsibilities include preventing the extinction, among other species, or the human species, insofar as it is possible for us to prevent this. But as well as avoiding there being too few humans, we also have responsibilities to avoid their being too many, and the total population being unsustainable, so that it subverts both itself and the populations of other species. We should also be concerned to sustain a tolerable quality of life for our successors. A good deal of environmental concern is based on these grounds. However, there is also value in the flourishing of other species, and our responsibilities include not undermining such value, but allowing as many as possible of these species to survive without their own environments being avoidably polluted. Besides, these responsibilities are not only negative ones, of refraining from certain actions. They require several positive courses of action, ranging from research and study, via education, to integrated policies of sustainable development, incorporating policies of preservation. As all this illustrates, ethics is these days incomplete without environmental components.

Environmental ethics also has to confront problems of decision-making in face of uncertainty. Standardly this problem has led to the discounting of future interests; but since future costs, if they happen, are liable to be just as great as current costs, ethicists usually reject the idea of discounting, except where there are specific grounds for doubting whether specific costs will arise. Meanwhile, wherever there is a significant possibility that costs may arise, environmental ethicists favour the precautionary principle, which (even in its more conservative versions) holds that the mere lack of scientific certainty (about risks or costs) is not to be treated as a reason against preventive action.

3. The stewardship or trusteeship role of humanity

Before I finish, I should add a little on the role of humanity. Anthropocentrism could be regarded as a version of humanism, which suggests that human welfare should be our sole concern. This I have rejected. But rejecting this stance does not require us to adopt the kind of egalitarian stance across species that says that each life of whatever kind (animal or vegetable) has equal value, and that we should act accordingly. For species differ greatly in point of their capacities, as we saw in connection with the capacity to suffer; another important distinction is between those able to act responsibly (some but not all humans, and possibly some others) and creatures of which such talk makes no sense. Differences of capacities and of interests can and should be respected; and this suggests that the egalitarianism of so-called Deep Ecology should be rejected alongside anthropocentrism, and that special respect should be given to the holders of powers that confer responsibilities. This may well leave us holding that humanity, or rather those humans capable of responsibility, have a special role as stewards or trustees of whatever is valuable; for the discharge of this role, we are answerable for playing our part to the whole community of responsible beings with which this role is shared, which on some views consists of human beings alone, and on others includes the creator of the universe, God. This, it is true, is a metaphysical position, which goes beyond ethics; but since such positions can help us understand our own position and thus inform ethics as well as motivating and inspiring ethical behaviour, it seemed wise to include it before stopping.

REFERENCE

1. Robin Attfield, *Environmental Ethics: An Overview for the Twenty-First Century*, Cambridge: Polity Press, forthcoming September 2003.

ETHICS IN ENVIRONMENTAL CONFLICTS

Markku Oksanen
Department of Social Psychology and Sociology, KUOPIO, FINLAND

A quick look at environmental discussion shows up that the ways humans conceptualise and formulate what is their vision of the ideal relationship with the rest of nature are full of contradictions, disputes and contests. People are simply not unanimous about how to treat the natural world. Whenever we encounter argumentative situations, the ethical and political dimensions of the human existence and behaviour become conspicuous. This is applies to environmental issues clearly. As an American environmental philosopher Dale Jamieson (2002, 329) states, " [--] ethical and political disputes [--] are at the heart of environmental questions." This is the case both at the conceptual and practical levels. Even though everyone might admit that sustainability is worth pursuing, the precise, concrete idea of sustainability remains contested; for instance, what precisely is a sustainable use of a wetland? The quality of contestability involves politics of contesting, that is, public argumentation and discussion about what the concept of sustainability, or any other concept of that kind, should mean in practice. Various modifications, such as weak and strong sustainability, has been put forward. This is typical of attributions of humans behaviour ("Is our behaviour sustainable or not?"), but also concepts of rather different category, such as 'nature', 'the environment' and 'the natural world' are ambiguous. Perhaps it can be claimed that all important terms in environmental discourse are contested and there is usually a political and ethical dimension in any endeavour to define them.

The main purpose of the paper is to present an overview of recent developments in the philosophical and ethical analysis of environmental conflicts. The emphasis is on the attempt to clarify what is the role of ethics and ethical reasoning both in the emergence and in the resolution of environmental conflicts. Are environmental conflicts ethical conflicts, and if they are, in what sense they are ethical conflicts? What kind of the implications this ethical characteristic has? I want to defend the idea that although the human use of nature is embraced by ethical choices, the substantive ethical considerations are not necessarily final, not at least in their own right: what matters in a democratic society is that collective deliberation regarding the use of nature must also satisfy procedural criteria of good social decision making. As I see, the conflicting views and opinions must be taken into account and the attempt to seek for and make compromises is vital for the development of environmental ethics as a part of public morality. This conclusion might not be a new one, but has been defended by numerous environmental ethicists who think of environmental ethics and democracy as compatible.

Philosophers, including myself, have paid a lot of attention to particular conflicts and formulated considered opinions about how to resolve them. In this essay, I want to address a more abstract question about the nature of environmental conflicts and analyse what aspects, if any, of environmental conflicts make them ethical conflicts. This is of importance at least for moral philosophers because if there is no ethical dimension in environmental conflicts, then it is difficult to motivate their ethical investigation.

In this essay I shall make five questions that, I hope, will help to understand what is the role of ethical deliberation on the environment in the liberal-democratic political context.

What do we mean by the notion of ethical conflict?

If in environmental conflicts is an ethical dimension, these conflicts are also ethical conflicts. The ethical aspect in these conflicts emerges out of roughly two kinds of relationships: it can emerge out of interhuman relationship or from the human relationship with the rest of nature. It is far from clear, however, that environmental conflicts can be ethical conflicts also in the latter sense and whether it is wise to conceptualise them in this fashion in the first place. It is a biocentrist claim that there are environmental ethical conflict of this kind. Anthropocentrists deny it. As they see it, environmental conflicts are fundamentally social conflicts stemming from discrepant human interests and ideas of land use that the parties of conflict have: in other words, environmental conflicts are conflicts between persons in regard to the best treatment of the environment. A particular aspect is that they are often, but not necessarily, conflicts in regard to the distribution of environmental benefits and burdens; it is this dimension in environmental conflicts that brings ethics in for anthropocentrists. Some green theorist claim that it is reasonable deem environmental conflicts as social conflicts because we are then in a position to avoid those perpetual debates about the rights of animals and intrinsic values in nature and the like. Moreover, we have rather clear and stable situation of conflict. The prospects for the total elimination of environmental ethical conflicts are, however, minimal and I would think of it as a serious drawback; there is a moral relationship between humans and the rest of nature. Thus, environmental conflicts are not reducible to human-human conflicts in any straightforward sense.

Philosophers tend to disagree about the source and the nature of ethical disputes. Some philosophers deny that there are genuine ethical conflicts and claim that apparent ethical conflicts are just conflicts concerning facts. Others think of ethical conflicts as conflicts of interests. And one group of philosophers

considers conflicts as something that disappear when the issue is scrutinised thoroughly and impartially. Conflicts are, however, a sociological fact. The notion of ethical conflict has to be defined.

Are environmental conflicts political or ethical or both by their nature?
What I want to emphasise is that environmental conflicts are complicated and multidimensional conflicts by their nature. This has a number of implications. Firstly, what might be the paradigm ethical conflict, conflicts in values (see Schmidtz 2000), it does not represent exhaustively the whole body of an environmental conflict. A conflict over the implementation of the EU's Natura 2000 programme in Finland is at the same time a conflict that extends to concern Finland's relationship to European Union more generally, because those opposing this programme tend to oppose the EU and direct their opposition at this particular programme. Secondly, often economic interests are at stake and a conflict over the use of an area is a conflict over prevalence of monetary values over other values. Thirdly, sometimes the maintenance of cultural practices or uncompromising commitments to religious beliefs and habits bring about conflict. *Purely* ethical conflicts are absent or rarely appearing in the environmental contexts and the emphasis on ethics may mislead us in our attempt to understand a quandary. But environmental conflicts do have ethical dimension as both the conflicts in priorities and in use stem from some ethical and moral commitments that the parties have made prior to the emergence of the conflict.

What is the role of ethics and ethical reasoning and argumentation in environmental conflicts?
To answer this question depends on our understanding on the nature of morality and ethical inquiry in general. Environmental conflicts are social conflicts in the sense that they involve two or more people who disagree about the best course of action. To resolve a social conflict often requires, ignoring the unequal power relations between the parties, to seek for compromises; a win-win outcome is, of course, the ideal compromise but often out of reach. The difficult question is whether compromises on values are ethically tolerable and whether compromises offer genuine solutions to ethical quandaries. (In land-use controversies, the deadlock situation seem to be rare, especially if we compare the situation to biomedical ethics or animal ethics.) In many cases, the ethical views people endorse are firmly fixed: people have ethical position they want to defend as far as possible and are not ready to move back. They think that ethical views are not something to be traded or negotiated about; ethical views are something to approve or disapprove. This is the view that can be called ethical monism. Against monism, there is a pluralist stance that stresses the importance of negotiations so that quandaries in opinion can be solved. However, in many cases people's ethical views are not eternally stable but can evolve and change.

Is it possible to solve ethical disputes over the use of the environment?
It is a truism to say that humans are political animals. The political community has a number of means to solve disputes. Political means include voting and deliberative procedures. Economic means include benefit/cost analysis which result in a decision that the maximisation of human welfare is a preferable option. Sometimes the emphasis on legal means that include various legal procedures and hearing of the local communities. Usually in grand-scale decisions about the use of the environment, such as wetland areas, all of these dimensions of social decision-making are present and probably there is a contest which one of these means matter most. However they are applied, in optimal situation a decision can be made – even no decision is a decision entitling various activities because the clause "what is not precisely forbidden is allowed" applies.

But is any of these means able to solve *ethical* disputes over the use of the environment?

What is the political legitimacy of the outcome of conflict resolution?
A democratic society can make all kinds of decisions that are procedurally correct and enjoy majority's support, but still face resistance in regard to their enforcement. This is also the crucial test for environmental legislation. In many parts of the world the state can be too weak and undeveloped to implement environmental regulation, or even if the state is strong and developed, the local communities may systematically resist new environmental laws that delimit their traditional liberties. While the former point is more or less a practical concern that can be used to question whether it is wise to rely on the state in the first place, the latter questions the political legitimacy of regulation more plainly. The political legitimacy of environmental conflict resolution and thus established environmental regulation depends on the idea of stakeholdership.

Jamieson, Dale. "Sustainability and Beyond." In *Morality's Progress. Essays on Humans, Other Animals, and the Rest of Nature*. Oxford: Clarendon Press, 2002.
Schmidtz, David. "Natural Enemies: An Anatomy of Environmental Conflict." *Environmental Ethics* 22(2000):397-408.

How Green is your Theology?

Melvyn Matthews
Canon Theologian, Wells Cathedral

1. Introduction

This talk is intended to give some parameters and pointers for the rediscovery of a coherent, Christian and biblican theology of creation. This is a rediscovery, because theology has been dominated by a theology of redemption for far too long.

But it is also a rediscovery of a proper coherent theology of creation for the reason that many creation thinkers blame the Christian tradition for the ecological crisis which we face, saying that the tradition of domination and use of creation, and hence destruction and the upset of its balance is due to the Christian tradition and its emphases drawing from Genesis 1: 28 and its statement that we have been given "dominion … over every living thing". I want to assert that the rediscovery of a proper outline of creation involves a rediscovery of the real meaning of dominion .

Inevitably a search for a 'proper' theology of salvation will not just involve scripture, but also a look at how the Christian tradition relates to more recent theories – such as 'Gaia' – the view that the earth is a self-regulating mechanism. Proponents of Gaia theory would claim that any interference by Christian do-gooders should be restrained, and we should simply accept our place and wait for things to regulate themselves. For them even "stewardship", the classical Christian view, is too much.

In other words what I want to do is to try to influence the patterns of your mind about the creation and perhaps shift those patterns somewhat in a greener direction, but the question remains How Green?

2. The Biblical position

We have reduced our understanding of creation to seeing God as the maker, perhaps the sustainer – but largely in mechanistic quasi scientific terms by which we reveal the extent of the influence of Enlightenment rationalism in our theology. There are a number of points to make here of course –

- The biblical account does not end with the last verse of Chapter 1 but at 2:4 and the establishment of the Sabbath; that day when peace and proper order prevails.
- The biblical account is not a scientific text book. This shown by the fact that there are two accounts. These are mystical accounts of our origin and being in God, kinds of existential statements about who we really are, and we reduce them in status by trying to see if they conflict with evolution.

Two theologians confirm this:

1. Moltmann He produced a substantial theology of creation in 1985 "God in Creation". Worth pointing out that this is a breakthrough for a Lutheran theologian because theology of the Word of God has prevailed since Barmen Declaration and the establishment of Confessing Church under Bonhoeffer. Natural theology is tainted because it was a natural theology which led to the view that human and political agencies could be, indeed were, instruments of the Kingdom. Hence insufficient protest at rise of Nazism, even, by some a feeling that God was using Hitler to cleanse the ayrian stables. So natural theology is tainted. But Moltmann recognises the importance of the ecological situation, sees that the Churches do not have a sufficiently strong theology of creation to understand this or with which to enable Christians to play their part.

Moltmann emphasies that the creation is incomplete without the coming of the Sabbath. The Sabbath is not simply an afterthought for Jews but an integral part of the creation which crowns and completes the whole. In the Sabbath we can see everything in relationship, everything in equilibrium, everything cohering together – everything in peace (shalom), wholeness and justice.

- It is important to remember that the Sabbath peace (Shalom) involves justice and wholeness.

- It is also important to remember that Jesus announces the messianic Sabbath (Luke 4). This is not a denial of Sabbath but a raising of nature of Sabbath to a new, global or cosmic level. Everything is intended to participate in this messianic Sabbath.

Moltmann therefore discovers inherent difficulties created by Lutheran past by reference to Sabbath.

2. Merton Thomas Merton the great mystic comes to a similar position, i.e. that we have reduced the doctrine of creation to a mechanical statement about origins rather than seeing it as a statement about who we really are. In other words we have allowed the scientific enlightenment to interpret Genesis for us and allowed considerations of evolution to dominate our exposition of Genesis. Merton says:

> *"The doctrine of creation is rooted not in a desperate religious attempt to account for the fact that the world exists. It is not merely an answer to the question of how things got to be what they are by pointing to God as a cause. On the contrary the doctrine of the creation as we have it in the Bible .... starts not from a question about being but from a direct intuition of the act of being. Nothing could be further from a merely mechanistic and causal explanation of existence. "Creation" is then not merely a pat official answer to a religious query about our origin ..."*

Now I believe that what Merton is saying here is vitally important. He says that the central thing about the Christian doctrine of creation is not so much that God began a process (and can be proved to have begun a process) hence God is creator – but that I (and each one of us) can intuit our own being as being there. "Self consciousness" is obviously part of what he means, but it is far more than that. It is an experience of the "baffling, humbling and liberating clarity of what it means to be …" and this contains within it an intuition of the being of God.

Perhaps something of what he means is to be found in the writing of Isaiah. There we have an enormously intense doctrine of the creation which is not so much concerned with origins, or the beginning of the world, but with this great sense of what it is to be which also involves God. Isaiah 43 "But now, thus says the Lord, he who created you O Jacob, he who formed you O Israel. Do not fear I have redeemed you … when you pass through the water … Everyone who is called by my name, whom I created for my glory whom I found and made."

There is in Deutero-Isaiah this enormously potent sense of personal identity combined with the strongest statements about the creating power of God. It is an exact parallel to what Merton calls 'a direct intuition of the act of being" which itself is wholly liberating. Indeed 2 Isaiah is also a story of liberation, this time from captivity in Babylon, prompted by the declaration of Cyrus – but it becomes a direct intuition of the freedom of their being and of the being of the creator God who sets them free. Chapter 45 "Thus says the Lord to his anointed, Cyrus … I will go before you and level the mountains" and the passage ends … "I am the Lord, there is no other. I form light and create darkness …."

And if we now return to Genesis 1 and Genesis 2-4 – the accounts of the creation we can perhaps see what I mean. These accounts are not, basically, about origins in that scientific sense, they are narrative theology of the highest order – narratives about origins which convey by narrative means something of that mystical sense of who we are in God. I said earlier that they were existential statements about who we really are and how we must be.

I have already pointed to the central place that the Sabbath has in these stories. In the Sabbath peace prevails, a peace which involves justice and righteousness – the right ordering of relationships, things and humans in right relationships with each other. This is what is intended. This is what is described in Chapter 2 when the two earthlings male and female are shown together – there is a mutual dependency in a circle of shalom.

- The emphasis is a partnership 2:20
- Eve is made of the same stuff as Adam 2:23
- Adam = earthling
  The Hebrew term 'Ish' (man) not used until woman also emerges in 2:23.
- The loss of shalom derives from the inability of the couple to accept their nakedness. 'Who told you that you were naked …?' is the question which reveals this lack of acceptance of the

original condition where mutual trust and interdependence were the source of life. It is from this point on that the trouble begins and, of course, this is derived from the desire for knowledge in the sense of 'knowledge over' and 'power over' rather than simple knowledge.

- Here we come to the point over the question of dominion – the dominion that is given to humankind in 1:28. This dominion is of a certain kind and should <u>not</u> be related to ideas of kingship and dominion derived from watching the movies. The verb here is used in the Old Testament of the rule of kings. The rule of Solomon is so described (1Kings 4.24) as is Psalm 110. The rule of kings in Hebrew thinking is never a form of domination by force. It is the rule where the king bears personal responsibility for the well-being of those whom he rules.
  In 2 Kings 6 during the Siege of Samaria the King of Israel is walking on ramparts wearing sackcloth, tears his clothes because of the famine thus exhibiting a responsible dominion which <u>suffers with</u> the people.

All of this is well summarised by Westemann in his commentary: "The author does not speak of the creation didactically, but in a way which confronts the hearer with its unfathomability. The account of creation speaks its own language. The simple fact that the first page of the bible speaks of heaven and earth, sun, moon, stars, planets and trees, birds, fish and animals of the field, saying that God is concerned with all these creatures, and not only with the human race."

<u>3. How did we lose this balance? Can it be recovered?</u>

The earlier tradition of the church is based upon a holistic view of creation which involves understanding the human race as being part of the created order and in symbolic relationship to it. This is not just confined to St Francis and the birds. Also part of the Celtic tradition

Many would say that this balanced or symbolic view was lost at the Enlightenment with the rise of 18th century rationalism. Sean McDonagh the RC theologian says in 'The Greening of the Church' "Bacon, Descartes and Merton were religious men but their scientific discoveries in the 17th century succeeded in undermining the organic holistic though static and often erroneous view of the world which had prevailed for the previous 1000 years." I would want to suggest that the process whereby the holistic/biblical view was undermined began a lot earlier than the 18th century and actually started when Christianity, or the mainstream of Christianity allied itself to the Imperium of Rome or Byzantium. Earlier Christianity was much more relational. This independent non-institutional form was recently celebrated by Mark Tully in his book "The Lives of Jesus" and Joseph Needlemann speaks of it in his book 'Lost Christianity'. This form of Christianity resurges every now and again – it looks to the teachings of the Desert Fathers, Meister Eckhardt and others – but it is essentially <u>green</u> and I shall return to some more contemporary forms of this expression – increasingly adopted by feminist writers later in my talk. My point now is to say that the important distinction not so much between a Christianity of Enlightenment and an earlier tradition, as a <u>Hidden</u> Christianity and another form which I will call the <u>Received</u> view.

This Received view has several myths.

A. That nature exists solely for man's benefit, derived from God's command to Adam to have "dominion".
B. That God is a wholly transcendent being totally separated from the world which he created and has no continuing interest in our involvement with its non human elements.
C. That the natural world is fallen as well as humankind and so is a sphere of profanity and darkness.

Let us deal with each of these myths in turn.

A. That nature exists for our benefit.

- As you will have gathered the biblical evidence – as expounded by the best biblical scholars – does not support this. The Genesis narratives involve companionship and stewardship.

Dominion is not tyranny or autocracy but a compassionate relationship. We look at dominion through the coloured spectacles of our imperial past.

- The 'naming of animals is delegated to Adam involves a relationship.
- All is constantly declared good.
- Peak or summit of creation is Sabbath not 'man'.
- Most important there is one category of 'living things', "Nefesh hayya"' in which humans are bound up with the rest and there is no mandate to kill since humans are portrayed as vegetarians.

The psalms especially 104, Job and the Wisdom tradition all confirm this. The universe does not revolve around us. Man is not the pinnacle of creation in the sense that being at the pinnacle gives him rights of control. "God brought things into being in order that his goodness might be communicated to creatures and represented by them; and because his goodness could not be adequately represented by one creature alone. He produced many and diverse creatures so that what was wanting to one in the manifestation of the divine goodness might be supplied by another." (Aquinas).

B. God is wholly transcendent while nature is a neutral stage where God acts out his wishes

- Bible does not regard natural word as neutral – trees clap their hands, valleys sing etc.
- Bible is as much about nature as about man and portrays nature as having a distinct relationship with God which is good.
- Jesus is Incarnate in this world.
- Body is temple of the Holy Spirit
- Sacramental view of nature is clearly central
- Continuous and developing creation has scientific support. Matter is never inert.

C. Nature also cursed – because of man's disobedience

This sort of talk is very dangerous and leads to the view that AIDS is retribution. The idea that nature is also fallen because of man's disobedience is a bad view of God and hopelessly anthropocentric and denies evolution where it is clear that natural disasters were occurring before man came on to the scene.

The Bible constantly talks of movement from chaos to order (not 'ex-nihilo'). Indeed scientifically speaking there is always an element of disorder or unresolved tensions in creation as part of its process of becoming. There is a constant movement towards the future. Indeed some say that even humankind is still subject to this process and that we are still becoming who we might be. Certainly Romans 8 and Paul's reference to the groaning and travailing of creation is part of that. So the apparent disorder of creation is not 'fall' but becoming.

In fact I would go so far as to say that the inner principle of creation is mutual sacrifice. All things are made to surrender themselves to each other and that this is how things are. In human life as in nature sacrifice and self-surrender are essential for the coherence of the human community and the preservation of the species. In this the creation exhibits the nature of the creator in whom self-giving is inherent.

So I believe that these myths must be abandoned in favour of a different view where the universe is sacramental of god, where God is constantly at work in his universe and where human kind is called to co-operate with that.

But also I believe that this view is not just a matter of exploding the myths of the past but having a positive vision of our own.

4. What are the elements of a positive and coherent view of creation?

1. What do we see around us: what sort of world/universe is it?

It is an immeasurably exciting beautiful complex wondrous universe which is revealing even more of its complexity and wonder as we speak. Nothing we say can do justice to its beauty, its immensity, its complexity. As soon as we have discovered one thing another becomes apparent. Different types of physics are needed to explain different phenomena – New Fonian physics is redundant at certain levels of enquiry, that we know, but now also Quantum Physics is redundant in different areas. But also as well as being complex the universe seems to be overwhelmingly wasteful and full of some of what from human eyes seems to be immeasurable levels of conflict. Species fall out of existence at an alarming rate as they are replaced by others. 90% of all species that have existed are now extinct. New diseases come to dominate when old ones have been 'cured'. Big Bang is still going on.

So it is clear to me that if we believe in God we can no longer (if we did) believe in a God who is the maker in the sense that I 'make' a piece of furniture or a painting. There is no point in talking about the Cosmic Designer, because if there is he is constantly redesigning what he had designed. Better I believe to talk of God "letting creation free" or "letting possibility be". He makes possibilities. In other words we have to abandon any concept of static creation and see God as effectively saying 'let's see what happens if'.

This is perfectly acceptable because God is loving and generous and so allows indeed wants his creation to develop and expand and change. God has faith in his own imagination and creativity and so unleashes the most amazingly complex world and calls us to enjoy and share in that adventure. The meaning of dominion then becomes "Come and participate with me in all this" – "be with me in 'seeing' all this". The trouble is, as Sara Maitland makes clear, our God is not big enough to take on what actually the natural scientists show us God is doing.

Creation then is "letting possibility be"

2. If this is the case what is God's relationship to the Universe?

Plainly, from the above account we cannot any longer cope with a God who suddenly intervenes across what he allows to happen. I believe God is present to the universe in the way that I am present to what I love – i.e. constantly present to it, never subsumed by it (so panentheism or whatever is no good) but allowing it to be while loving what it does. Ruth Page calls this 'concurrence'. How are we present to our children or the children we teach? We allow creative possibilities but these creative possibilities come into being because of what we say. Things go apparently wrong but with the presence of love the wounds are involved in the mending – we become who we are because of where we were broken.

So God's presence to the creation is constant, attentive, infinitely loving and infinitely caring. It is a genuine 'suffering with', a genuine delighting and a genuine setting free. Without that presence the universe would fall into chaos; with that presence the reality of what the universe can be constantly unfold. God is present to the universe as a lover is present to the beloved. I would characterise this relationship as a relationship of contemplative attention. Ruth Page in her book 'God and the Web of Creation' calls this 'pansyntheism' or 'concurrence' and says it is characterised by '**noticing**', **attention**', '**caring**' and '**sharing**'.

In this scenario Jesus is constantly present to God who is constantly present to him. He is the one who is so constantly aware of God's contemplative attention to and suffering with him that he is the word of God or the Son of God. He is the one in whom the concurrence of God is constantly and perfectly realised.

3. This means, I believe that our attitude to the creation must itself be a similar response of contemplative attention and that this is facilitated by or engendered in us by the Spirit and supported by the life of the Church. But notice this, we are not to be makers, constantly remaking or attempting to remake, but contemplative seers looking, attending, until we see what it is that God is doing. This is undoubtedly the more difficult way. It is even more difficult than the classical notion of stewardship.

I believe that when we attend to the creation in this way and are thus open to the contemplative attention of God from the other side of what is, as it were; then things happen which would not otherwise have happened and the universe becomes more of what God wills it to be. There is a physics of God at work and we have to be contemplative enough to discern that physics – just as when we attend to those whom we love sufficiently then what we thought impossible occurs. If you love enough then the world changes, but God's love needs our love for that to happen.

4. What about the Fall?

I believe the fall is a falling away from potential and that this is inevitable in us – but it happens because we run too quickly and too self-centredly to do God's will not because of any inherent fault in the way things are.

It is also important to recognise that this will recur – sin is not something which does not befall those who are well intentioned. Indeed those who are well-intentioned increase their capacity for sin, but sin is part of what will happen in the setting free. It is a greater good to God that freedom is possible in his creatures than that this freedom should never have been. God takes the risk of allowing sin.

5. What sort of contemplative attention is required of us in the ecological crisis which we face?

Well, surprisingly, I do not believe that the Christian answer is contained in deciding courses of action – even non-violent action. The real question is not what shall we do but what shall we be. If we wish to recover a true Creation Theology then we have to allow that we are within the web of creation but with a particular responsibility to see, to sing of and offer what we see. Doing is less important. So I would want to advocate that priesthood is the proper activity rather than stewardship. Stewardship always implies activity – priesthood implies seeing, attending, caring and offering. That is the function for which we were created, Stewardship is still too active. This recovers role of priest in focusing what humans should be like. Our priesthood recalls all humanity to its proper function.

References

- J Moltmann 'God in Creation'
- Thomas Merton 'Conjectures of a Guilty Bystander'
- Bradley 'God is Green'
- Bradley 'The Power of Sacrifice'
- Sara Maitland 'A Big Enough God?'
- Annie Dillard 'Pilgrim at Tinker Creek'

ECONOMIC AND POLITICAL APPROACHES TO UNDERSTANDING THE RE-CREATION AND MAINTENANCE OF WETLAND HABITATS.

John Bryson, School of Geography, University of Birmingham.

(Copies of material handed out and used as a basis for his presentation)

Even society as a whole, a nation, or all existing societies put together, are not owners of the Earth. They are merely its occupants, its users; and like good caretakers, they must hand it down improved to subsequent generations. (Marx, Captial, vol 1.)

In this world which is so respectful of economic necessities, no one really knows the real cost of anything which is produced. In fact the major part of the real cost is never calculated; and the rest is kept secret. (Dubord)

The rise of political ecology: the new theoretical approach that makes causal connections between the logics and dynamics of capitalist growth and specific environmental concerns.

Complexity

- Different habitats - Different types of wetlands
- Different histories of wetland exploitation/use.
- Different histories of wetland management
- Conflict between former and current management systems
- Different political systems
- Different and constantly changing networks of actors involved in the exploitation and management of wetlands.
- Different scales of wetland management
- Pressure groups - overemphasis on individual species at the expense of maintaining the complexity of the ecosystem.

All this complexity requires complex methodologies.

Use and Exchange Values

Focus on the social dynamics of wetland environments

The fundamental conflict is between

Use values and exchange values

Market value associated with land as a commodity (exchange values)

Use values equate to the broader role of specific places as socially situated contexts for a variety of life functions.

Land is a special type of commodity - it can be sold, rented, leased as well as used to live in. It also has a tourist, environmental value and scientific value.

Markets are social phenomena and have the basic criteria of all commodities - they are used and exchanged but through social contexts. **To understand wetlands we need to focus on the changing social context through which they area used (managed, regulated, protected) and exchanged.**

A Constant state of becoming: development/preservation

Advantages and disadvantages of development are unevenly distributed. These distributional consequences are central to land use conflicts. A variety of actors operate to determine what is protected, improved, destroyed or developed.

A balance must be developed between exchange and use value. Frequently pressure groups develop that focus on use values. However, such changes are also economic, but they do not necessarily translate into exchange values.

The neoclassical response suggests that people who do not favour specific developments would relocate (i.e. change brand in a commodity market). Nevertheless, in most cases geographical inertia means that people have to stay and fight.

The result is that the landscape is in a ***constant state of becoming*** as places achieve their reality through social organisation mediated through political and institutionalised structures.

Information and knowledge

Role of information in the land management nexus.

Does better or more information produce improved environmental outcomes?

The answer is 'no' as the political context and political power are critical determinants of whether, how and when information is used in decision making.

How to identify the knowledge and information that is driving change or that is trying to preserve the present state?

There are two issues here:

1) How is scientific information and knowledge incorporated into wetland management strategies? Who is creating the information? Who is interpreting it? Who is applying it? Who decides which scientific perspective has priority?

The answers to these questions have been addressed by studies that have applied *actor network theory* (ANT) in a number of different environmental contexts.

There must be a balance between 'scientific' national or global expertise and local expertise.

In many instances the importance of local knowledge is ignored or rejected as irrelevant to the expertise-orientated model of land and land resource management that tends to dominate.

What has developed is bureaucracies of environmental management constructed around the idea of a neutral scientific expert and their knowledge of a discipline and its methods rather than familiarity with a specific place.

2)Which decision makes acquire positions of power?

ANT suggests that individuals/organisations will:

a) engage in **problematisation** - try to become indispensable to other actors in the drama by defining the nature and problems and suggesting that these can only be reconciled by the actors **'Obligatory Power of Passage'.**

b) Processes by which actors try to lock other actors into the roles that have been proposed for them - for example passive recipients of management strategies developed by an environmental agency etc.

These are all ***'moments' of translation*** in which a group of actors try to impose themselves and their definition of a situation on others.

Translation is thus a process of becoming; it is never a completed accomplishment and may fail.

To complicate matters many different 'actors'; may be involved in the habitat with each trying to impose their own definition of the problem.

Audience Development: Creating spaces

Transforming spaces into special landscapes

Role of Protection Agencies - local, regional and national

Role of private enterprise - for example the transformation of the Grand Canyon into one of America's greatest icons and tourist destinations. The role of the Sante Fe Railway and the Fred Harvey Company:

The rails brought the canyon into the real of industrial tourism … the grand Canyon was fast becoming a commercial commodity and a cultural cliché (Pyne, 1998: 116).

Scales of Environmental Management

Scale - a central feature of the natural sciences, but ignored until relatively recently by the social sciences.

Scale is fundamental to the understanding of natural systems, but ir is equally pertinent to the operation of social systems and to the interface between biological, physical and social systems.

The scale of management can be used as a political and economic tool to maximise exchange values at the expense of use values.

Ecosystem management - attention still tends to focus on land and resource management under the direct control of an agency.

Many ecosystems span multiple jurisdictions and hence are managed in a fragmented manner - water in wetland management.

Fragmented management is especially important in areas with fragmented ownership - ownership boundaries divide the landscape and decrease the degree of integration in land use management.

Institutional fragmentation is partially to blame for the failure of existing institutions to reduce the loss of biodiversity.

Need to use ecosystems as the basis for land management. As Caldwell argued in 1970 - *the conventional political matrix must be unraveled and revowen into a new pattern.*

Boundaries drawn around places separate things but also bind things together - boundaries exclude as well as limit inclusion.

Organisations in a Constant State of becoming

Environmental Agencies/Pressure Groups/Far,mers/ Academic Discplines are all **Temporary Coalitions.**

This is debate that concerns the operation and activities of firms. In Human Geography and many other social sciences the 'firm' is taken as a given entity; a focus for research.

All types of firms, however must be conceptualised as temporary coalitions; coalitions of people who come together, each with different types and levels of expertise.

The implications of this approach are that:

- Organisations are not static
- As the people change so too does the expertise
- As the people change so too does the networks in which the organisation is embedded
- As the people change so too might the perspective of the organisation
- Needs an historical and expertise approach to understand organisational behaviour
- Effectiveness of an environment agency will depend largely on the temporary coalition of people who work in the organisation.

CONCLUSION

Limitations on wetland management imposed by:

- Existing land ownership
- Environmental agencies as temporary coalitions
- Time frame of management intervention - short-, mid- or long-term
- Conflicting stakeholders - different interests - economic and environmental (Wetlands for migratory birds as against an holistic approach to environmental management).
- Role of the market system to regulate the environment is limited by the short-time frame of economic actors.
- Value of landscape is inconsistent with neo-classical economic theory and Marx's labour theory of value. Need new ways of conceptualising landscape in economic theory.

Methodological Implications

- Need to identify all actors involved - ANT? Network Approach?
- Identify and understand the implications of different management strategies - role of displacement
- Explore the role of temporary coalitions - different ways in which national and international management ideas/policies are performed into practice.
- Identify the ways in which knowledge flows into the wetland decision-making systems - which types of knowledge are rejected and which accepted?
- Role of time in the activities of organisations involved in wetland management
- Need for comparative research

An introduction to ecological economics

- Focussing on the valuation of natural resources -

Katrin Oltmer

1. Introduction

According to the International Society for Ecological Economics (ISEE), ecological economics aims at promoting the understanding between economists and ecologists and the integration between their disciplines. The ISEE states that "*a cross-disciplinary approach is necessary because conflicting perspectives in economics and ecology have led to economic and environmental policies that are mutually destructive, rather than reinforcing and sustainable*" (ISEE, 2003). However, why have economists become interested in the environment, anyway? Generally speaking, economic science deals with the allocation of scarce resources. Having this in mind, it can be concluded that environmental quality is becoming scarce, otherwise it would not receive the attention of economists.

An important part of ecological economics is the monetary valuation of natural resources. Assigning a monetary value to natural resources implies the association of a positive number of currency units with some service provided by or some damage done to the natural environment. The main objective of valuing natural resources is to obtain information for social decision making (Common, 2003). Assigning monetary values to natural resources enables economists to treat environmental goods, such as wetlands, biodiversity, clean water, air and soil, wildlife scenery, just as any other commodity that can be put into the basket of market choices (Gowdy, 1997). Once natural resources and environmental effects have been made comparable to other economic goods, they can be analysed with the conventional tools of neo-classical economics, or they can be used in a cost-benefit framework for policy evaluation. Another objective of monetary valuation of natural resources is the desire to obtain a measure of national income that accounts for the availability of natural resources and all kinds of environmental damage (Common, 2003). This type of national accounting is also known as 'green accounting', and it should ultimately lead to a measure of sustainable national income (see Atkinson et al., 1997; Gray, 1994).

The subsequent sections give an overview of the following issues. Section 2 introduces the different types of values, economists assign to natural resources. Section 3 gives the basics of the most popular methods for the valuation of natural resources. These methods are the contingent valuation method, the hedonic pricing method and the travel cost method. Section 4 is the final section and it will shed some light on the question why neo-classical economic theory may be inappropriate for analysing environmental goods and services.

2. Values of Natural Resources

The valuation of natural resources is an invention of human beings. Any value that is assigned to a particular service provided by the natural environment is hence the value that human beings *think* the service has. In other words, human beings can only value a service if the service contributes to their personnel welfare, or, in economic terms, to their individual utility. Certainly, from an ethical viewpoint, natural resources also have intrinsic rights and values that impose constraints on the way in which these resources should be used by human beings. Such rights and values can, however, not be incorporated in a utility-maximising, economic framework, since they just cannot be estimated. This does not mean that these rights and values should not be taken into account in decision-making processes that have potential impacts in the environment. It does rather imply that the information provided by the valuation of natural resources is only part of the information that should be considered in a decision-making process (Perman et al., 1996). In the following discussion we want to concentrate on the types of values human beings are able to estimate.

From an economic viewpoint, the services provided by natural resources have different components of value. Loomis et al. (1991) identify five different components:

i) Recreational use value

Value arising from the recreational use of a resource, such as recreational fishing in a wetland and lake area, biking and hiking in a nature reserve, bird watching etc.

ii) Commercial use value

Value arising when the resource is used as input for economic activity, such as the production of timber, commercial fishing, etc.

iii) Option value

Value arising from the uncertainty of individuals about their future demands for environmental goods and services.

iv) Existence value

Value derived from the human preference that the resource has to be preserved as such, regardless of any use to which the resource may be put.

v) Bequest value

Value arising from the knowledge that future generations will be able to enjoy the existence of the resource.

These five components of value can basically be divided into use and non-use values. Value i), ii) and iii) are use values and value iv) and v) are non-use values. Remark that also the non-use values are defined from the viewpoint of human beings. The *knowledge* that a particular resource exists contributes to the satisfaction of the individual's utility. These values are hence different from the intrinsic value of natural resources that has been mentioned earlier. The sum of the five components of value is the total economic value of the resource. It is important to note that the total economic value does not have to be confused with the total value of the resource to the ecosystem (Brouwer et al., 1999).

Vatn and Bromley (1995) have criticised that the common distinction between use and non-use value neglects a component that is specifically directed towards the functional aspects of environmental services. Functional aspects describe the contribution of environmental services to life-supporting mechanisms, such as the hydrological, the carbon or the nitrogen cycle, ecological diversity and the interplay between species. As a reason for this, Vatn and Bromley mention the inability to describe these services as a demarcated object. In other words, these services cannot be 'commoditised'. The contribution of a functional environmental service is unknown. In fact, the precise role of the functional environmental service only becomes apparent when the service stops to function. *"It is through failure that we learn about the critical ecosystem functions that, while working, are transparent."* (Vatn and Bromley, 1995, pp. 6-7).

Monetary valuation of natural resources is thus mainly concerned with the use and non-use values of environmental services. The following section gives a short description of the three most popular valuation methods: the contingent valuation method, the hedonic pricing methods and the travel cost method.

3. How to value natural resources

The three methods for monetary valuation described below can be divided into revealed preference methods and stated preference methods. Revealed preference methods retrieve the value of natural resources through their association with some marketable good. Stated preference methods obtain the value of natural resources through directly asking people about the value they assign to the resource. The hedonic pricing method and the travel cost method are examples of revealed preference methods. The contingent valuation method is an example of a stated preference method.

i) Contingent valuation method (CVM)

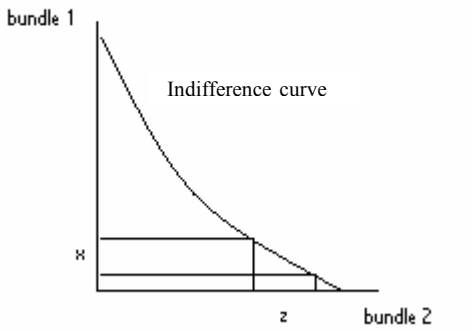
In the CVM approach, people are asked directly, using questionnaires of surveys, about their willingness-to-pay (WTP) for the improvement in the quality or quantity of some environmental good or about their willingness-to-accept (WTA) for its deterioration. The information that can be retrieved by CVM is conditional upon some particular market context. This context describes the precise characteristics of the environmental quality change, how it would be implemented, how payments would be made etc. (Perman et al., 1996).

ii) Hedonic pricing method
The hedonic pricing method values environmental services by analysing the prices of marketable goods that embody particular attributes of those services. A popular example of this method is the valuation of clean air through residential property prices. Empirical evidence shows that there is a positive relationship between the price for housing and the air quality in the direct neighbourhood (for an overview see Smith and Huang, 1993). This means that the price of a house in an area with little air-pollution is higher than the price of a comparable house in an area where the air is more polluted. The value of the non-marketable good 'clean air' is hence revealed by the price of a house in the less-polluted area. A hedonic pricing study focussing on the influence of trees, water and open space on the price of houses in the Netherlands showed that the direct vicinity of water and open space can cause an increase in house prices of more than 10% (Luttik, 2000).

iii) Travel cost method
The travel costs method values the non-marketable recreational and cultural facilities provided by environmental amenities. In general, this method implies the observation of the travel costs people spent for reaching a recreational site, such as a nature reserve, a fishing or hunting place. The travel costs, mainly in terms of time and money spent to reach the site, reveal the value the visitors of the site assign to the available environmental resources.

It may have become obvious that the hedonic pricing method and the travel cost method are only able to give information about the use value of a natural resource, whereas CVM is also able to give information about the non-use values of a resource. This may be the reason why ecological economists apply CVM far more often than the former two methods. The remainder of the paper will therefore focus on CVM.

4. Neo-classical economic theory and natural resources?
Neo-classical utility theory is based on two concepts: substitution and indifference. The two concepts imply that individuals are able and willing to exchange one bundle of goods for another bundle without affecting their level of welfare. In other words, there exist several bundles of goods that a consumer regards as substitutes for the bundle of goods he or she currently consumes. An important point is that more of one good can always compensate for less of another good. An illustration may clarify this mechanism.



The indifference curve indicates that the consumer is indifferent between bundle 1 and bundle 2. The figure shows that decreasing amounts of one bundle can be substituted by increasing amounts of another bundle. For example, reducing bundle 1 by x requires an increase of bundle 2 by z.

The concept of substitution and indifference may be valid for many consumer goods. However, there are also goods for which these two concepts do not apply. One example describes the level of aircraft noise. In 1973, Jansen and Opschoor performed a CVM study, in which they found that 50% of the respondents refused compensation for the noise impact of a new Dutch airport via lower house purchase prices, no matter how low the price is put (cited by Spash, 2000a). In a situation in which the goods of one bundle (including lower housing prices) cannot substitute the good of another bundle (including a low level of noise), standard utility theory does not apply. The consumer always prefers

the bundles with one particular good A and, additionally, the bundle which contains most of good A is ranked highest, no matter how many other goods the other bundles contain. In economics terms, this type of behaviour is named lexicographic, since it describes the strict ordering of goods according to the consumer's preferences, as in a lexicon (Spash, 2000a).

Lexicographic preferences are considered to be the reason why researchers encounter 'irrational' responses and protest bidding in CVM studies investigating existence values. Irrational responses and protest bidding imply that an individual's view about the rights of nature does not correspond to his or her bids they respond to the CVM questionnaire. Such individuals agree, on the one hand, with a statement that says that nature (or particular elements of nature) have the right to exist regardless of any benefit or harm to human beings. The same individuals are, on the other hand, not willing to pay everything they could to prevent a loss of nature, and often they refuse to pay altogether. It is assumed that a refusal to bid is equivalent to very high or infinite bid. The WTA for lexicographic preferences is infinite, since where no substitution exists, there may be situations in which no alternative bundle of goods (such as extra income) can compensate for a foregone increase in the quality or quantity of environmental goods and services. Recently, progresses have been made to handle these difficulties in CVM studies. Furthermore, attempts have been made to include ethical motives in CVM studies (see Spash, 2000a, 2000b; Hart and Latacz-Lohmann, 2001).

References

Atkinson, G., R. Duborg, K. Hamilton, M. Munasinghe and D.W. Pearce (1997). *Measuring Sustainable Development: Macroeconomics and the Environment*, Edward Elgar, Cheltenham.

Brouwer, R., I.H. Langford, I.J. Bateman and R.K. Turner (1999). A meta-analysis of wetland contingent valuation studies. *Regional Environmental Change* 1(1): 47-57.

Common, M. (2003). Monetary Valuation. *Internet Encyclopaedia of Ecological Economics*. http://www.ecologicaleconomics.org (accessed on 10th August 2003).

ISEE (2003). http://www.ecologicaleconomics.org (accessed on 10th August 2003).

Gowdy, J.M. (1997). The value of biodiversity: markets, society, and ecosystems. *Land Economics* 73(1), pp. 25-41.

Gray, R.H. (1994). Corporate reporting for sustainable development: accounting for sustainability in 2000 AD. *Environmental Values* 3: 17-45.

Hart, R. and U. Latacz-Lohman (2001). The indifference curve, motivation and morality in Contingent Valuation. *Environmental Values* 10: 225-42.

Loomis, J.B., M. Haneman and B. Kanninen (1991). Willingness to pay to protect wetlands and reduce wildlife contamination from agricultural drainage. In A. Dinar and D. Zilberman (eds.) *The Economics and Management of Water and Drainage in Agriculture*, Kluwer Academic, Boston.

Luttik, J. (2000). The value of trees, water and open space as reflected by house prices in the Netherlands. *Landscape and Urban Planning* 48: 161-67.

Perman, R., Y. Ma., J. McGilvray (1996). *Natural Resources and Environmental Economics*. Longman, London.

Smith, V.K. and J.C. Huang (1993). Hedonic models and air pollution: twenty-five years and counting. *Environmental and Resource Economics* 3(4): 381-94.

Spash, C.L. (2000a). Ecosystems, contingent valuation and ethics: the case of wetland re-creation. *Ecological Economics* 34, pp. 195-215.

Spash, C.L. (2000b). Ethical Motives and Charitable Contributions in Contingent Valuation: Empirical Evidences from Social Psychology and Economics. *Environmental Values* 9: 453-79.

Vatn, A. and D. Bromley (1995). Choices between prices without apologies. In: D.W. Bromley (ed.) *The Handbook of Environmental Economics*, Blackwell, Cambridge.

The Deontic Dimension:
Valuing the Kokemäenjoki Delta and the Yyteri Peninsular

Juha Hiedanpää, University of Turku, Satakunta Environmental Research Institute

Early Draft 030926

Purpose

The purpose of this paper is threefold. First the purpose is to examine what kind of development plans stakeholders have concerning the utilization of primary and secondary ecological values in Meri-Pori, second, what are the most important environmental problems therein, and, third, what advice they offer for the sake of reconciling contesting views of development.

Meri-Pori

Meri-Pori (Sea-Pori) is the NW-corner of the city of Pori in SW Finland. The Kokemäenjoki delta frames the area in the east and the Gulf of Bothnia in the west. Yyteri peninsular dwells in between. The area is unique in various ways. Not only is it constituted by natural beauty and the multitude of ecological values, but also the multitude of other interests and productive practices varying all the way from off-shore shipping yards and chemical industries, the second biggest export harbour and the biggest fishing harbour in Finland to a coal power plant, windmill farm, recreational opportunities and farming communities etc.

There is one special characteristic to it – land uplift. After the melting of the glacial ice about 10 000 years ago, the land surface still arises about 1 cm a year (of which 0,6 cm comes from the land uplift and 0,3 cm from sediments brought in by the river). The Yyteri peninsular moves fast, geologically speaking, towards Sweden and gets farer from the city centre. The phenomenon of land uplift makes Meri-Pori unique in many respects.

Not only is the Kokemäenjoki river delta the largest in Scandinavia it is also ecologically the second most significant in Finland (after Liminganlahti, eng. Liminka pay, in Oulu). And this is due to the land uplift. The delta is a wetland mosaic where each phase of succession is simultaneously present – i.e., all the ecological potentials are actually present all the time. As a consequence, the delta is an important resting and nesting area for the various species of migratory birds. Coastal meadows and wetland forests, mainly inhabited by common alder, add to the diversity. Also the delta islands constitute a dynamic landscape element, unique to the area. The most critical parts of the delta are part of the European-wide Natura 2000 reserve network.

The Yyteri peninsular is ecologically and geo-morphologically significant. There are sand dynes, endangered coastal meadows, and wetlands. The landscape of it is unique. And consequently, the area is socially and culturally important. The peninsular is in rather heavy recreational use. As it is, the international forest company, UPM-Kymmene, owns about 1000 hectares of forest. To show the respect to the uniqueness of the area, the company has a special landscape scheme in its forest management planning and practices. There is network of extensive public hiking trails on the peninsular. Preiviiki Pay is highly significant resting and nesting area for the migratory birds. The most of the meadows and wetlands of the Yyteri peninsular are part of the Natura 2000 reserve network.

Therefore, the development and environmental plans concerning the future of the delta of river Kokemäenjoki and Yyteri peninsular will always, by necessity, be challenged by the plentiful multitude of conflicts of values, interest and knowledge. As it is, the significance of the delta has been contested many times already. One the most dramatic examples of this is that, a couple of years ago, the Environmental Agency of SW Finland (supported by the Environmental Protection Office of city of Pori) sued the city of Pori (the Construction and Zoning Office) because of the careless consideration of the areas belonging to the Natura 2000 reserve network. As a conclusion of the litigation process, the Supreme Administrative Court of Finland decided that the city of Pori (the Construction and Zoning Office) acted against the law when it prepared the general zone for ecologically vulnerable areas in the delta.

As for different example is the Meri-Pori Life project (1996-1998). This successful process taught one important lesson. The development and environmental planning, valuation and decision-making are

not easy jobs around the delta of the river Kokemäenjoki or Yyteri peninsular. Not only is the reason differing interests and purpose of the interest groups, but, perhaps more importantly, the reason is uncertainty about what, in fact, is there and what are the practical effects of multilevel and in many ways overlapping regulatory systems put in place to maintain and enhance what is expected to be there. Due to the complexity of practices, actors, purposes, networks and rules of the game, stakeholders are do not know for sure which activities are allowed and which prohibited and which permitted. The area seems to be stabilized at the edge of consensus and conflict.

Valuations

As it is, Meri-Pori is a complex of formal and informal institutions – collective action – that constraints, liberates and expands the opportunities and possibilities for individual action (On institutions as collective actions see Hodgson 1999; Commons 1990). I call this contingent set of institutions a deontic complex. In such a complex certain social practices cannot, can, must and may be exercised. There are historical and present day reasons for why and how some activities are possible, allowed and even encouraged while some others are not, being strictly impossible or prohibited. And this is the case also in Meri-Pori.

The deontic complex produces many sorts of goods, services and experiences to sustain and enhance particular forms of life within. A healthy system grows, self-organizes and gets more diverse – as Rod Swenson (1996) has said, "life is a river that runs uphill". As a deontic complex Meri-Pori is not an exception to this. Populations, groups, firms, stakeholders and interest groups are in a continuous process of expressing their views concerning the admired future, the good means to get there, and workable tools to be applied. As open systems, they engage in active work of making the complex a better place to live, from their particular perspective. They engage in a particular kind of deontic game. In this game they have two tasks: to have an effect on their own internal conditions of development and in the external environmental conditions deemed problematic. This is a deontic game of asking for and giving of reasons for prohibitions, obligations, permissions and already exercised social practices (Brandom 1994).

The deontic game is about asking for and giving of reasons for valuations and exercised values. As Friedrich Nietzsche (1968, 380) wrote: "The standpoint of 'value' is the standpoint of conditions of preservation and enhancement for complex forms of relative life-durations with the flux of becoming." To him, then, value is life. Value as life utilizes actively and spontaneously potentials and possibilities. Valuation, on the other hand, is a reactive process. As a reactive activity, valuation puts conditions and entities against each other. As pragmatist John Dewey (1934, 389) writes, "Valuation takes place only when there is something the matter, when there is some trouble to be done away with, some need, lack, privation to me made good, some conflict of tendencies to be resolved by means of changing existing conditions."

As such, values are only rarely articulated in the practice of development and environmental planning. However, valuations are articulated, at least to the extent reasons are asked for them. The binary between value and valuation may prove useful in exploring the deontic complex as both a terra for spontaneous growth and a territory of friction, constraints and boundaries – that is, environmental problems of various kinds. *Our task is to explore values and valuations concerning the delta of the river Kokemäenjoki and the Yyteri peninsular.*

Materials and Methods

We conducted theme-interviews with the key environmental and recreational actors in Meri-Pori in summer 2003. The 19 interviewees were clustered in three groups: environmental, land use, leisure time, and tourism planners from the city of Pori (4), regional environmental authorities (1), firms whose business depend upon the existence of ecological goods and recreational services (9), environmental groups (3) and other organized actors (2).

The thematic questions were: (i) what are the significant primary and secondary aspects of ecological capital in Meri-Pori, (ii) how the stakeholders are going to develop their business (values), (iv) what are the most important environmental problems (valuations), (v) what are the means for workable conflict resolution, (vi) what will the delta look like in 30 years and what is the role of interest group in the development.

Each interview took about one hour, and were taped and trans-littered. The material was analyzed by reading it through and through, several times, or as many times necessary for the patterns to start to emerge and tentative results to materialize.

Tentative Results

Stakeholders pretty much shared the views concerning the admired. In other words, stakeholders shared the views concerning the goodness of the abstract societal goals that sign up the future. For instance, in 30 years time, sustainability issues are put up front, the exercise of productive practices is more efficient and economically feasible than today, and the civic society is actively engaged in public deliberation concerning the development and environmental issues of Meri-Pori. As a second aspect to the admired, stakeholders also abide to and honor the existing set of formal norms: there are no attempts to transgress the formal boundaries. The boundaries may and, to the certain extent, also must be challenged and changed. But together with the abstract societal goals and formal norms, the third aspect of the admired, formal codes of conduct, will lead the practice of development and environmental planning to improvement. These, should I say, aesthetic views to the future state of the area are shared to a surprising extent.

As for the ethical dimension, the views are more diverse. Quite naturally, the desired outcomes of collective action differ, or, at least, the ends-in-view (in the intermediate time-horizon) differ. As it is, some stakeholders yearn for more trails and bird-watching towers and some others roads for four-wheelers or horses. There is a plentiful multitude of different ends-in-views because grouping s and their members are engaged in different productive practices and purposes. And for this same reason the views concerning the right differ. The questions emerged: Who has a right for that and that? Who has a right to such and such? At the bottom, as it seemed, it is a question of social approval. And depending on the conditions, these standards of approval may be highly turbulent or stabile. At the moment, the negative and positive social emotions concerning the development and environmental planning activities in Meri-Pori are stabile.

It seems that especially functional issues give rise to a lot of troubles. Stakeholders are embedded into deontic complex in which a plentiful multitude of different practices (communal traditions, conventions, customs, and routines depending on the scale) are exercised. To the certain extent, stakeholders seemed to know what is going on, but only limitedly so. On the other side to this, the formal regulatory systems supervision, guide and direct the ways in which informal institutions are exercised. And as it is, stakeholders seem not to be too aware what formal rules are in force, that is, which activities are allowed, which require a permit and which are prohibited. For instance, what is the relation of the Natura 2000 Programme to the other formal land use regulations?

Discussion

It seems that the stakeholders think pretty much the same way about the direction of the development of the Kokemäenjoki Delta and Yyteri peninsular. That is, abstract societal goals, stakeholder ends and local customs into which these are embedded are acknowledged and to the certain extent also respected. At the abstract level, the present day status quo is acknowledged and respected. But at the level of ends and communal consequences of those ends the direction is contested. From the vantage point of development and environmental planning, this seems to be an interesting situation. Namely, it is should be possible and also rather rewarding to create scenarios – general (not abstract) alternative pathways of development in the long and intermediate haul. And, by doing so, it would afford discursive and collective means to explore the critical conditions of abstract consensus and the processes of co-evolution underway beneath. This is what we do during the next phase of our study.

As the stakeholders had an ambivalent view of the direction the same can be said about the order as well. As the formal norms were respected, moral order of things was active contested in every day activities and proposed development plans. As it is, the interest groups and stakeholders have different histories and are depended on different productive practices, and for this reason there is no common ground for long-lasting normative or moral order and this fact brings conflicts perpetually onto the surface. For this reason, during the next phase of the research we will take a closer look at the structure and dynamics the deontic complex. A plea for reasonableness entails the identification of functions critical to the sustainability, growth and environmental problems. And for the sake making

the moral nature of the situation clearer, functional groups will be identified and named. Both the humane and non-humane groups (populations and stakeholders) may constitute a functional group. Functional group is a cluster of groups that sustain or enhance the same particular function within the deontic complex. By exploring critical functions and functional groups, stakeholders may be in a better position to discuss and decide what are reasonable ends, what productive practices are right and who has a right to exercise them, and according to what social criterion development plans may be executed and problems solved.

The questions concerning the direction and order come down to the question of acceptance. It is good and important that the formal standards of substantive issues, procedure and conduct are met in development and environmental planning, valuation and decision-making. But it is equally important that also the informal standards of approval are met. By informal standards I refer here to social emotions that emerge as expressions of how well formal institutions meet the informal ones, that is social emotions are expressions of institutional health. When something life-enhancing emerges from within the deontic complex, it is applauded with positive emotions, such as joy, happiness etc. The reverse is also true, because social emotions are pretty often reciprocal. This is what needs to be explored in deontic complex of Meri-Pori. As it seems, a lot of deliberation, dialogue and learning need to take place before the issue of acceptance is tackled.

In order to make sense of values and valuations, the aesthetic, ethical and functional dimensions to them, and the socio-political conditions of direction, order and acceptance, the substantial and procedural aspects of the development and environmental planning must be taken under scrutiny. It is a high time also to consider various support systems. In the future, in relation to Meri-Pori, our institute will apply and test many planning, valuation and decision-making aids, one candidate being the computer based Hierarchical Preference Analysis (Hipre) (www.hipre.fi) and one situational analysis (see Hiedanpää 2003). The former is based on decision theory and the latter on institutional economics. As a result, we attempt to create articulated group perspectives and scientifically sound functional profiles.

Literature

Brandom, Robert (1994). *Making It Explicit*. Massachusetts, Boston: Harvard University Press.

Commons, John R. (1990) *Institutional Economics*. London: Transaction Publisher.

Dewey, John (1939). *Theory of Valuation*. Chicago: University of Chicago Press.

Hiedanpää, Juha (2003). ”Situational Analysis in Development and Environmental Planning: The Regional Plan of Satakunta, SW Finland.” *Manuscript*. Initially submitted.

Hodgson, Geoffrey (1999). *Economics and Utopia*. London: Routledge.

Nietzsche, Friedrich (1968). *The Will to Power*. London: Vintage Press.

Swenson, Rod (1996) “Autocatakinetics, Evolution, and the Law of Maximum Entropy Production: A Principled Foundation Toward the Study of Human Ecology.“ *Advances in Human Ecology*, 6: 1-46.

THE SOMERSET LEVELS AND MOORS: PHYSICAL BACKGROUND AND HISTORY

Chris Bradley

The Somerset Levels and Moors is an extensive area of 35,000ha that is one of the UK's largest remaining wetlands. Although the Somerset Levels has a long history of land drainage, peat extraction, and agriculture, it is internationally recognised for its ecology and archaeology and includes 16 Sites of Special Scientific Interest (SSSIs). The designations of these individual sites recognise the diversity in bird life, aquatic invertebrates and wetland flora (particularly in the ditch network). The Somerset Levels was also designated a RAMSAR wetland in 1997, and is a 'Special Protection Area' under the European Union Directive on the Conservation of Birds (Jenkins, 1998).

The wetland that we know as the Somerset Levels today, consists of a mosaic of habitats situated within a topographic basin, bounded on the north by the Mendip Hills, by the Blackdown Hills on the south and by the Severn Estuary to the west. The main physical feature, that extends across the Levels, are a series of broad valleys filled with peat and alluvium that are associated with four East-West flowing rivers: the Axe, Brue, Parrett, and Tone and their tributaries, and which dissect the Polden Hills. The individual low-lying peat and alluvial levels along the river valleys are called 'moors', and although the 'Somerset Levels' is often used to refer to the whole region, the Levels are actually a silt / clay belt between the moors and the sea (Purseglove, 1988p. 246).

Although, as we shall see, the Somerset Levels has a complex history of human use and management extending over several thousand years, if we are to understand the inter-relationships between the human and the physical environment, we need to look at the way the Somerset Levels and Moors developed through the Holocene (i.e. over the last 9,000 years since the last glacial maximum). Over this timescale, the landscape – both its surface topography and its vegetation communities – has also changed to reflect a combination of processes, including the effects of changing sea level, the development of a coastal barrier island which impeded river flows and changes in precipitation.

A considerable number of studies have examined the way the Somerset Levels developed through the Holocene. These have utilised the extensive archaeological remains that have been preserved within the peat deposits (e.g. Coles & Orme, 1982), pollen analysis (e.g. Godwin, 1943) and dating of sedimentary layers (e.g. Haslett *et al*. 1998). The work has enabled three stages in the natural evolution of the Somerset Levels can be identified:

i. Melting of continental ice following the last glacial maximum, led to an increase in sea level, inundating the topographic basin and valleys of what is now the Somerset Levels, although isolated upstanding islands remained above sea level. The basin was gradually in-filled with silts and clays, and with peat lenses reflecting vegetation growth during periods of lower sea level. Vegetation communities were mainly sedge, reflecting wet conditions and calcareous runoff from the surrounding limestone hills.

ii. At about 6500 years BP, a fall in relative sea level led to the development of extensive reedswamps and the accumulation of herbaceous peat. As the surface rose through peat accumulation, drier conditions led to a change in vegetation community to a wet woodland (of birch, willow and alder) and the accumulation of wood peat.

iii. From 5,000 BP, higher precipitation led to generally wetter conditions and the development of raised bog (with sphagnum, moss and cottongrass).

Over this period also, the broad coastal belt accumulated sediment, that largely consisted of layers of alluvium overlaying peat, so that today it forms a surface varying in height from 6-7m asl (Gilman, 1994 p. 21). Elsewhere, however, the landscape of the Somerset Levels is very different from its 'natural' state which would be an extensive raised bog. Although in many places, the sedimentology of the Somerset Levels and Moors reflects these environmental changes through the Holocene, with individual wetlands variously consisting of organic peat soils, marine clays and alluvial deposits, the Levels have experienced a combination of extensive peat digging over almost 2,000 years, and periods of intensive drainage works that has modified the natural pattern of inundation whether from high sea level or river flooding.

To understand how the 'natural' wetland has changed we need to appreciate how the pattern of traditional land-use evolved in the Somerset Levels, and which continued, albeit with some adjustment until the early 1990s. Local farming was predominantly based upon summer grazing, although an extensive withy industry existed until comparatively recently. However, local people, and landowners, also made exploited the fisheries potential of the Somerset Levels, and peat was excavated on a local scale from Roman times. The rights to peat digging, or turbary, were closely protected, with the peat used locally as a fuel. Increasingly, however, the farmers and landowners came to rely upon water level regulation over what became an increasingly fragmented landscape. This utilised an extensive ditch or rhyne network, and from the 13th Century onwards, large projects were undertaken to regulate the pattern of river flooding and ensure the rapid movement of floodwaters through the Levels. At first these consisted of embankments along the channel margins, but then increasingly, channel meanders were removed to improve river flows, and in some cases substantial new channels were constructed, for example, Kings Sedgemoor drain, which was excavated between 1791 and 1795 over a distance of 12 miles.

Although not all the drainage projects that were conceived were completed, however, the context in which drainage was undertaken is interesting in that it sets the context for more recent engineering works. In the 17th and 18th Centuries, the social and political context was as important, if not more important than the physical or engineering challenges that were presented. For example, Barnes (1982) describes the political context to the plans to drain the Somerset Levels in the early 17th Century. Much of the land was formerly owned by the monasteries and had reverted to the crown after the dissolution of the monasteries in 1563. In the 17th Century, drainage of the Somerset Levels was considered a useful source of revenue for the King, but for each project a special commission had the responsibility to drain and divide the land, while the responsibility for subsequent supervision and management of the drains lay with the Court of Sewers. Management at this time reflected the strained relations between the Crown (landowner), the commissioners (generally local men), the agents, the manorial lords and the commoners. All were working for their own interests and against each other. In Barnes words:

'the commissioners were in the invidious position of deciding between the claims of their powerful peers, the lords of the manors, and the claims of a multitude of free-holders.'

Barnes, T.G. 1982. Somerset 1625-1640: a county's government during the "personal rule". University of Chicago Press, 369pp.

Coles, J.M. and B.J. Orme. 1982. Prehistory of the Somerset Levels. Somerset Levels Project, 1982. 64pp.

Gilman, K. 1994. Hydrology and Wetland Conservation. John Wiley and Sons, Chichester

Godwin, H. 1943. Coastal peat beds of the British Isles and North Sea. Journal of Ecology,

Haslett, S.K., P. Davies, R.H.F. Curr, C.F.C. Davies, K. Kennington, C.P. King, and A.J. Margetts. 1998. Evaluating late-Holocene relative sea level change in the Somerset Levels, southwest Britain. Holocene, 8, 2, 197-207.

Jenkins, A.L. 1998. The Somerset Moors: Wetland, Floodplain or Prairie? In: Bailey, R.G., Jose, P.V. and B.R. Sherwood (Eds) United Kingdom Floodplains. Westbury, Otley, 371-377.

Purseglove, J. 1988. Taming the flood: a natural history of rivers and wetlands. Oxford University Press, 307pp.

The Somerset Levels – the Recent Debate

Adrian Armstrong[1]

Although the history of the levels has been one of gradually increasing water control, the issue of the future of the Levels has become a matter for public debate only over the last 30 years or so. There are perhaps three major historical factors leading to the crisis in the early 1980's.

1. UK Agricultural Policy of increasing food production:

The experience of the last war showed that the UK was excessively dependent upon food imports. Consequently, governments pursued policies of increasing the productivity of UK agriculture, and economic support for farmers. For many years, guaranteed prices for agricultural products underpinned the market, and grants were given for the capital investment and infrastructure improvements. These measures transformed UK agriculture from the depressed pre-war state to a highly productive and profitable enterprise. In 40 years, the productivity of UK agriculture effectively doubled.

Particular relevant to the Somerset Levels was the availability of grants for drainage. During the 1960s, a series of wet autumns had led to a series of years in which farmers had great difficulty in cultivating. The fear was voiced that their modern practices, notably the use of large tractors and similar equipment, (whose purchase was supported by government grants) was leading to irrevocable soil damage. Consequently, the 1970's saw an enormous campaign to drain agricultural land in which about 1 m ha were drained: approximately 1/3 of all land that could potentially benefit from such a treatment. This drainage activity was focussed mainly in the cereal growing areas of the East of England, where farming was more capitalised, and the risks greater.

The drive to improve land by drainage largely passed Somerset by until the late 1970s, probably due to the fragmented land holdings. It took an organised effort to co-ordinate the activities of a group of landowners, the Internal Drainage Board, and the Water Authority to alter the drainage regimes, which were largely created by the imposition of ditch levels. It became clear that, with suitable drainage control, much of the Somerset Levels peatland could become highly productive and profitable arable land, comparable to the Fenlands of East Anglia. The latter had been converted from an extensive swamp, to a highly productive agricultural area. However, this same example was perceived by conservationists, as an ecological desert. With the will of the landowners, and the active encouragement of the MAFF, the scene was set for a transformation of the levels.

2. The European dimensions

Simultaneously, UK was adjusting to its role as a partner in the European Economic Community. Agricultural prices were still supported, although by European Rules via the Intervention Board, and farm grants were also subject to European rules. Nevertheless, in the 1970s, the situation of a state-supported farming industry continued. What changed, however, was the size of the economy. UK was no longer an island with a food shortage, but part of a Community with a food surplus. Subsidised overproduction of food was in the long-term unsupportable, and led to a series of measures at the European level, subsequently known as the McSharry reforms of the CAP. In the interim, the public perception of farming changed radically. Historically, the British press had always been sympathetic, seeing the farming community as guardians of an English way of life. Suddenly, they became the "Barley Barons" reaping enormous profit from ruthless modernised agriculture.

3. Birth of Environmental Concern

More or less simultaneously, the environmental movement (a convenient shorthand for a large and complex set of interlocking concerns and movements) came to prominence. The UK public concern for the environment grew only slowly. It was not until the late 1970s, that opposition to land use changes was voiced. Two cases were particularly in the public eye: the Norfolk Broads and the Somerset Levels. In both cases extensive areas of grazing meadows were under threat from the combination of intensive drainage and arable conversion. The main impact of the timing of this

[1] Entec UK, 17 Angel Gate, London EC1V 2SH

development was the recognition that concern for the nature conservation coincided with problems of agricultural overproduction. Hence there was soon pressure to adapt the European farm support system to one in which the measures to support agriculture, necessary from a socio-economic point of view, were redesigned for the benefit of the environment.

4. The Additional Complication in the Somerset Levels – Peat Extraction

Historically, the right to cut peat for fuel (Turbary rights) was an important usage associated with common lands. This was locally destructive, but on a small scale. However, this "cottage" activity was replaced by modern peat extraction, driven by demand for peat in the gardening industry. Considerable areas were licensed for extraction in Shapwick area of the Levels. Modern practices can strip the peat to depths of 2 m, and replace them with pits that can become water-filled. Although they involve the complete loss of the habitat and the resource, peat extraction can lead to the creation of new, alternative habitats: inland open water.

5. Conflict

The various pressures came to a head in the late 1970s, when the Nature Conserancy Council published a consultation document (NCC 1977) that identified some possible futures for the Levels. The three main pressures were:

- The wish of the farmers to improve the land;
- The wish of the peat exploiters to extract peat;
- The wish of the conservation bodies to preserve the landscape and prevent any further 'degradation'.

The problem was further exacerbated by the large number of players, both pressure groups and those with responsibilities. These included:

- *The farmers.* These were a far from organised group, there being many individual small farms. Only a few landowners had accumulated moderately sized blocks of land. Further, the farmers themselves had no obvious organisation. However, they were to a degree represented at the national level by the National Farmer's Union, that was vociferous in its opposition to any control over the farmer's right to do with their land whatever they wished.
- *The Internal Drainage Boards,* who are responsible for the maintenance and operation of the drainage systems in the Levels. These IDBs level rates on landowners within their catchment and decide their priorities by a complex voting scheme which is weighted according to the size of the land held by each farmer in its area.
- *The Wessex Water Authority* (it was at the time) with the responsibility for the main river flowing through the Levels. Their major concern was the control of flooding, and so were concerned to maintain the main river structures, and to operate them in the most effective way to minimise flood damage, both to the Levels, but also in particular to urban areas.
- *The Ministry of Agriculture, Fisheries and Food* was involved in at least two levels – the local and the national.

At the local level, MAFF officials were concerned to implement MAFF policy to drain agricultural land. They were empowered to organise landholder groups to implement collaborative schemes, as part of their remit to encourage adoption of the national policy. However, they had no room for manoeuvre if they felt a drainage proposal was potentially environmentally damaging. The land drainage act and the subsequent MAFF grant schemes failed to recognise this possibility. Consequently, the only grounds on which a MAFF official could refuse grant aid on environmentally damaging schemes, would have been that it was technically unsound. As those same officers almost invariably designed these schemes, they could rarely invoke this reason.

At the National level, MAFF was also involved in establishing policy. It was a late as 1975 that the government had published its white paper: Food from our own resources (MAFF, 1975) which clearly re-stated a policy of increasing agricultural production. It appearsd to be sympathetic to the needs of the large land-owners, and the "improvers" lobby

- *The Department of the Environment* was also involved, as the sponsoring department for the Nature Conservancy Council. This was strongly influenced by the large land-holders, and those favouring the "improvement" of the levels.

- *The Nature Conservancy Council*, was charged with protecting the Natural resources of England and Wales. Its main tool for doing so was the designation of areas as "Sites of Special Scientific Interest".
- *The Royal Society for the Protection of Birds (RSPB)* had moved from being a specialist organisation concerned solely with birds, to being a flagship campaigning organisation for the preservation of the natural environment in general and wetlands in particular. In particular it was concerned to preserve the lowland wet grasslands that were so important for over-wintering waders.
- *The Somerset County Council,* who were concerned with planning matters, as well as the general well-being of the area. In particular they had been concerned about the future exploitation of the peat reserves, and the impacts this would have on the rural environment.

This list is almost certainly incomplete, and it certainly does not include the individuals and local groups campaigning on both sides of the argument. However, it does indicate the enormous complexity of the interlocking responsibilities and interests. Under these circumstances, the resolution of conflict was particularly difficult to achieve.

6. Drainage Plan for West Sedgemoor.

The conflicts surfaced again when, in 1977, the water authority (Wessex Water Authority) proposed a major drainage scheme for West Sedgemoor, which would have attracted a major grant from the Ministry of Agriculture. It was suggested, almost certainly correctly, that lowering the water table would dramatically increase agricultural productivity and improve the chronic access problems that render much of the moor inaccessible for much of the year. However, the scheme raised public concern, and soon became the focus for a public debate. The scheme was in the end turned down by the farmers themselves, who considered the cots of replacing of "wet fencing" and summer drinking water supplies for grazing cattle too costly. However, the public debate was well opened, and as a result, the RSPB began to buy land in West Sedgemoor as it became available. Consequently the Nature Conservancy Council decided to designate West Sedgemoor a Site of Special Scientific Interest, to help preserve it. West Sedgemoor was a particularly good example, being at that time still largely unimproved, a single hydrological, ecological and agricultural unit.

One factor that probably helped preserve the moors was the extremely fragmented patterns of land holding. Many moors, including West Sedgemoor, were split into many small fields, delineated by ditch lines or rhynes, with a complicated pattern of ownership. Very few farmers had consolidated blocks of land, and most had land on the adjacent uplands, on which stock were over-wintered. The main farming enterprise was thus summer grazing, often by small and relatively light stock that would not poach the soft surface. Productivity was low, as were agricultural incomes. Land improvement appeared to farmers to offer the prospect of real economic gain, and it was no surprise that many farmers were keen to embrace the prospect of a new improved system offered by improved drainage systems. However, the isolation of the area also breeds a "sturdy independence" that resents outside interference, and this has been the source of much of the opposition to the conservation movement.

The decision to designate West Sedgemoor an SSSI was seen as a test case for the whole of the Somerset, and also for the whole of the conservation movement. The decision took over a year, and despite intense lobbying by agricultural lobby, the designation was made in November 1982. The result was an outcry among farmers, mainly a reaction against what they saw as outside interference in there affairs. Despite this, the decision had been made, and was seen as a major triumph for the conservation.

After the battle lines had been drawn, the issue simmered, but gradually the two sides learned to live with each other. During the 1980s agricultural over-production continued to dog the policy-makers, and there was certainly no market for the increased production of grass and hay that would have been the result of drainage improvements. The real change came with the introduction of the Environmentally Sensitive Areas (ESA) scheme. In the ESA legislation, the Ministry of Agriculture was enabled to designate areas in which they could pay farmers to undertake practices that would protect or enhance the environment. Within each of the areas, the farmers could enter into a voluntary agreement with MAFF, in which they adopted a prescribed set of management actions, for which they would receive payments. This approach, of payments for voluntary agreements has managed to steer

the course between protection of the environment and the regard for farmer independence. In practice, the most basic tier has been a payment for farmers to retain in their existing "traditional" practices, and prevent agricultural intensification.

.

7. The Somerset Levels and Moors Environmentally Sensitive Area

The Somerset levels and Moors ESA was established in 1987, and extended in 1992. The aims of the ESA were: *to protect and, where possible, enhance the wet permanent grassland character of the area, and its special landscape, wildlife and historic interests, by encouraging the maintenance and adoption of extensive pastoral farming systems.*

To meet these aims three distinct levels, or tiers, of payments available have been implemented. Successively higher tiers allowed the adoption of successively higher degrees of "conservation" management, and consequently higher levels of payment. Initially, there were just two tiers in the Somerset ESA, but this was extended to three tiers.

8. The current picture

The ESA agreements form the basis for the current management of the levels, although the older institutional arrangements of the designation of areas as SSSIs still remains, and for this reason English nature (the successor to the NCC) still have an active involvement in promoting the conservation of the moors.

There are also a number of additional factors that affect the current state of the levels.

- The continued acquisition of land by naturalist bodies. For example, the whole of West Sedgemoor is now owned and controlled by the RSPB, and is managed solely as a nature reserve. However other bodies such as the Somerset naturalists Trust also own quite a lot of land.
- The creation of the Environment Agency, to embrace the old functions of the Wessex Water Board, and the NRA. The Agency has a remit which involves the positive promotion of environmental ends, and whereas its prime function in the levels still remains the control of the drainage network, and the control of flooding, it is now involved in the positive encouragement of environmental schemes. It has thus been concerned for example with the development of schemes for the implementation of Tier 3 agreements in critical blocks of land.
- The development of a tourist industry concerned to witness the levels as a conservation feature. There are thus a number of visitor centres, catering to the wishes of tourists to see crafts such as willow making, to see historical sites and reconstructions, and so on. This is all part of a much greater public awareness of the Levels and Moors as a natural area, a resource to be preserved, and a place for recreational visiting.

It can however be argued that the current situation is driven by the economic state of British farming. It is clear that farm incomes in the UK are as low as they have been for several decades, and that few farms are making a substantial income. Under these situations, the ESA payments are a welcome source of income, and indeed in some cases the main source. It remains an open question whether the apparent conversion of the farming community to the needs of the ESA would survive an economic upturn in the fortunes of farming.

Field excursion information :SOUTHLAKE MOOR
Somerset Levels & Moors Environmentally Sensitive Area

Compiled by Owen Mountford

A) General site description
(Adapted from www.somerset.gov.uk/levels/Slake.htm *Somerset County Council* website)

National Grid Reference: **ST 370300** *etc*	Area: 196.1 (ha) 484.6 (ac)
Date Notified (Under 1981 Act): 1985	Altitude: <7m ODN, generally *ca* 3m ODN

Southlake Moor forms part of the extensive grazing marsh and ditch system of the Somerset Levels and Moors ESA, and is itself a Site of Special Scientific Interest (SSSI) notified under Section 28 of the Wildlife and Countryside Act 1981. The land lies in the basin of the River Parrett, which forms part of the boundary of the site. The soils are mainly of the Midelney Series (thin layers of alluvial clay over peat which is within 90 cm of the surface) with a small area of the more silty Newchurch 2 Series. Such soils develop where subject to regular flooding, and warping (deliberate flooded in winter by means of a sluice from the river) was practised on this site in the past. In this respect Southlake Moor differs somewhat from the rest of the Levels and Moors.

Embankments were built around the moor in the early fourteenth century, and the basic network of rhynes (larger drainage channels) was excavated. The peat and lower levels of alluvium are permanently waterlogged, and surface soils are moderately acidic to neutral in reaction. The water table is high throughout the greater part of the year - the extensive system of rhynes and ditches being penned at a high level in summer. Parts of the moor were included within the ESA in 1986, but achievement of raised water-level conditions was not practical until a comprehensive scheme was introduced in 1993.

The majority of the moor is permanent grassland with a wide range of grassland types resulting from varying topographic and management conditions, including a summer hay-cut with aftermath grazing. There is much variation in species composition, although *Anthoxanthum odoratum*, *Holcus lanatus* and *Festuca pratensis* are constant species. *Cirsium dissectum*, *Thalictrum flavum* and *Silaum silaus* are occasionally present. Drier fields contain *Centaurea nigra* (phytosociological alliance *Cynosurion cristati – NVC* type **MG5** and **MG6** Rodwell 1992) whilst the many wetter fields have vegetation dominated by *Carex* spp, *Juncus* spp, *Caltha palustris* and *Oenanthe spp* (phytosociological alliance *Calthion palustris – NVC* types **MG8** and **MG9**), or more rarely by *Eleocharis palustris*.

Ca 100 species of aquatic and bankside vascular plant species have been recorded from Southlake Moor. A range of ditch cleaning methods are employed (including much hand clearance), encouraging diverse aquatic communities with a good submergent flora. Larger ditches are commonly dominated by *Hydrocharis morsus-ranae* and both *Elodea canadensis* and *E. nuttallii*. Six pondweed species occur including the local *Potamogeton trichoides* which is abundant. The emergent flora is rich, with *Sium latifolium*, *Hippuris vulgaris* and *Hottonia palustris*. The diverse bankside vegetation includes many local species, such as *Carex vesicaria*, *Butomus umbellatus* and *Althaea officinalis*.

The aquatic invertebrate fauna includes two notable *Odonata* (*Coenagrion ellum* and *Brachytron pratense)* together with two local species, the mollusc *Gyraulus laevis* and the bug *Sigara semistriata*. Terrestrial invertebrates are less well known but include the rare soldier flies *Odontomyia ornata* and *Stratiomys furcata*. When the moor is flooded, large numbers of wildfowl may be present; with up to 22,000 *Anas penelope*, 250 *Cygnus bewickii* and good numbers of *Aythya farina, Anas crecca* and *Aythya fuligula*. When floods recede, large flocks of *Vanellus vanellus* and *Gallinago gallinago* return to feed, with *Calidris alpina* and *Limosa limosa* often present. Much of the moor remains moist into the spring and early summer. providing suitable conditions for breeding *Gallinago*, *Tringa*

totanus and *Vanellus*. Regular signs of the *Lutra lutra* are seen on the banks of the River Parrett, whilst ditches on the east side of the site contain *Triturus helveticus*.

B) Recent ecological research and monitoring

Since 1978, and especially since *ca* 1993, Southlake Moor has been the subject of detailed survey and monitoring on behalf of English Nature (*e.g.* Cox 1997; Hughes 1995; Wallace & Prosser 2003). From 1993 to 1998, the Moor was also incorporated into a programme of research funded by the Ministry of Agriculture (MAFF - now DEFRA) whose aim was to assess techniques for wetland restoration that might be employed as part of agri-environment schemes. MAFF wished to know whether these management prescriptions were effective in both arresting the degradation of lowland wet grasslands and in enhancing the desired biodiversity. These studies were conducted jointly by the NERC Centre for Ecology and Hydrology, ADAS Land Research and the University of Cranfield (Gowing 1996; Mountford *et al.* 1999; Treweek *et al.* 1996). Certain scientific objectives were pursued that would aid in the development of agri-environment policy:

1 Assess the effect of water management actions (*e.g.* raised water levels - **RWL**) on i) soil characteristics, ii) agricultural opportunities and operations; and iii) wildlife.
2 Establish the relationships between water management actions, agricultural management and the ecological status of wet grassland.
3 Incorporate agronomic, ecological and hydrological data into a GIS for Southlake Moor
4 Evaluate a range of water-management scenarios (Swetnam *et al.* 1998).

Consequently, two groups of fields were monitored on Southlake Moor from 1993 onward. The first group were **Tier 1** fields where there was no alteration to the water-regime, but where a more extensive agricultural management was followed *i.e.* low levels of fertiliser application and limited (usually no) pesticides or herbicides. In contrast the **Tier 3** fields had splash-flooding during winter, penned summer-levels and, amongst other extensive methods, no inorganic fertiliser. There were little or no differences in the vegetation composition before the splash-flooding was first implemented during the winter of 1993/4.

The 1994 survey suggested that **Tier 3** management had had rather little immediate impact on the vegetation, though bare ground was more extensive, possibly as a result of extensive sward death due to the flood. Assessment in 1998 and 2002 revealed clear differences:

- **Tier 1**: in both 1998 and 2002 there was evidence that species typical of moist (but not waterlogged) and lower fertility situations had increased. The abundance of obligate wetland plants was apparently related to rainfall patterns, with declines during the exceptionally dry springs and summers of 1995-6 but recovery and indeed increases in the wetter seasons since 1997.
- **Tier 3**: True wetland species increased under raised water-levels, as did plants more typical of damp (but not wet) pastures. Major declines were observed in species typical of the **MG5** drier hay meadows. Changes were pronounced at first, with a reduced trend after the dry years of 1995-6, but then a clear stimulation of species adapted to wetter conditions from 1997 to 2002 under more typical rainfall patterns.

Analysis of data from Southlake Moor data and other experimental and monitoring sites in the region produced a number of key findings for the first 5-10 years of raised water-levels:

- Species typical of semi-natural old hay meadows declined under such perturbation.
- Increased aeration stress in the **RWL** fields produced an initial sward die-back and spread of *Agrostis stolonifera*, which subsequently declined to leave a species-poor swamp. There was more evidence of a richer wetland sward developing after 10 years.
- Micro-topographic variation had a marked impact on vegetation composition, with micro-sites differing by as little as 10-20cm in elevation liable to very different stresses.
- Species could be grouped into those a) associated with high aeration stress and low drought stress (spreading in the **RWL** fields) and b) significantly commoner where there was low aeration stress

and a moderate drought stress (typical of unaltered water-regimes and moist, rather than wet, fields).

- Some impact of previous fertiliser treatments was detectable up to 7 years after the cessation of such application. Fields that had received high levels of nitrogen for the 7 years continued to have higher cover of some grasses, and reduced cover of low forbs.
- Previous fertiliser application may alter the subsequent invasibility of the community, favouring certain species.
- Within the first 5-10 years, implementation of **RWL** led to the partial replacement of an old meadow vegetation (National Vegetation Classification **MG5** and **MG8**) by a ruderal community (*NVC* **OV28**), swamp (*NVC* **S6**, **S22**) or inundation grassland (*NVC* **MG13**).
- In agronomic terms, **RWL** led to difficulties and delays with cutting hay, reduced re-growth following the cut and limited duration of aftermath grazing.
- Reduced hay yields and digestibility were observed, with evidence of poorer mineral content and clear reduction in utilised metabolisable energy.

In conclusion, application of raised water-levels to areas with high botanical (or invertebrate) biodiversity value should be exercised with caution, and consideration given to alternative prescriptions for increasing site wetness, especially with regard to avoiding anoxia and sward death at the start of the growing season. Biodiversity impacts were clearly negative in the first decade, though there has been some tentative indication that swards valuable for plants and invertebrates (as well as birds) may develop in time.

C) References and related bibliography

Cox, W.P. (1997). *Effects of raised water levels on grasslands at Southlake Moor SSSI, Somerset.* Third Progress Report (1993-7). Taunton: English Nature.

English Nature (2001). *Conservation Requirements for the Somerset Levels and Moors SPA/Ramsar/SSSI and Wider Wetland*. Taunton: English Nature

Environment Agency (1999). *Somerset Levels and Moors Water Level Management Action Plan.* Bridgwater: Environment Agency

Farming and Wildlife Advisory Group (2002). *Farming Systems and Raised Water Level Areas.* Kenilworth: FWAG

Gowing, D.J.G. (1996). *Examination of the potential impacts of alternative management regimes in the Somerset Levels and Moors ESA.* Report to the Ministry of Agriculture. Silsoe College.

Hughes, M.R. (1995). *A botanical survey of ditches: North Moor and Southlake Moor SSSIs, Somerset, 1994.* Taunton: English Nature

Mountford, J.O., Manchester, S.J., Barratt, D.R., Dale, L.C., Dunbar, F.M., Green, I.A., Sparks, T.H., Treweek, J.R., Barber, K.R., Gilbert, J.C., Gowing, D.J.G., Lawson, C.S., Morris, J. and Spoor, G. (1999). *Assessment of the effects of managing water-levels to enhance ecological diversity.* Final report to the Ministry of Agriculture, Fisheries and Food. MAFF Commissioned Project BD1301.

Rodwell, J.S. (1992). *British Plant Communities. Volume 3. Grasslands and montane communities.* Cambridge: University Press.

Swetnam, R.D., Mountford, J.O., Armstrong, A.C., Gowing, D.J.G., Brown, N.J., Manchester, S.J. and Treweek, J.R. (1998). Spatial relationships between site hydrology and the occurrence of grassland of conservation importance: a risk assessment with GIS. *Journal of Environmental Managemen*t, **54(3)**, 189-203.

Treweek, J.R., Mountford, J.O., Brown, N.J., Manchester, S.J., Sparks, T.H., Stamp, T.R., Swetnam, R.D., Caldow, R.W.G, Gowing, D.J.G. and Lambourne R. (1996). *Effects of managing water levels to maintain or enhance ecological diversity within discrete catchments*. Final ITE Report to the Ministry of Agriculture

Wallace, H.L. and Prosser, M.V. (2003). *Effects of raised water levels on grassland vegetation on the Somerset Levels and Moors: Results for Southlake, King's Sedgemoor and Moorlinch (1995-2003).* Taunton: English Nature

CASE STUDY 2 : THE VALLEE DU DRUGEON

Geneviève MAGNON PETIT-MAIRE[1]

The Community of communes of the plateau de Frasne and the vallée du Drugeon was formed on the first day of 2003 and succeeded the Syndicat Mixte (it comes from a new French law). The Syndicat was established in 1993 to implement a protection and rehabilitation policy for the Valley of the Drugeon. This site is a wetland of national and international importance, having designation status under EC NATURA listing (FR 430 1280 Habitat Europ.Dir. and FR 431 0112 Bird Europ. Dir.). The Community is a local authority which represents 10 communes and manages about 2 500ha of wetlands in the community of the Valley of Drugeon and the community of the Larmont (15 communes at all). The other natural biotopes are agriculture or forest biotopes.

The natural resources represented comprise: 19 habitats, 3 floristic species (*Saxifraga hirculus, Liparis loeselii, Drepanocladius vernicosus*), and about 4 faunistic species of the European Habitat Directive (butterfly and dragonfly). There are also about 50 species cited in the Bird Directive, including Crex crex, Gallinago gallinago (the Drugeon valley is the first French nesting site for this species).

A programme of work for the restoration of the wetland status has been funded through the LIFE programme from 1993 to 1997, with parallel support form the French ministry of the Environment (1 500k€). The Syndicat also has support from the local communities.

The Syndicat has been responsible for the hydrological management of the site, local liaison and the provision of scientific support for the project. A lot of hard works have been done with the LIFE project:

- 30 km of river (Drugeon) have been re-meandered, because engineering work in the 1960's had drained all the valley and the river;
- about 200 ha of bushed wetlands have been cleared;
- about 1 500ha of wetlands of public or private property have been contracted with the Syndicat for natural wetland management;
- about 200 ha have been bought by the Syndicat for a policy of conservation and recreation;
- 9 horses have been bought for the natural management of the wetlands;
- a special tractor has been bought for the natural management of the wetlands;
- 2 technicians have been employed, one for the river recreation and another for the natural management of the wetlands (horses, tractor, scientific regular of fauna and flora);
- 1 very modern water cleaning station has been build for the 9 communes;

As a result, the syndicat is now responsible of a lot of work associated with recreation, protection and management of the wetlands, with the communes and with the people of the communes.

Other parallel programs had been connected with the LIFE project :

- an agri-environnement program, in which 74 farmers have been allowed to build contracts between farmers and the French and European Agriculture minister to stop using fertiliser near wetlands and water courses and cutting grass late in the year (for some of birds that nest in wetlands, even after June)
- another agriculture program has enabled a new farm to be built that can prevent the use of fertiliser for 6 months each year (there is about 3 months of rain and 3 months of snow when fertilisers can't be spread).
- A clean water project – a water cleaning station has been built and is in order from 2000.

[1] *Mairie –25 560 FRASNE- France - tel :03 8149 88 84/FAX :03 81 49 82 06*
email : SYNDICAT-DRUGEON@wanadoo.fr; internet : www.val-drugeon.or

They are also responsible for the dissemination of information about the site, including the production of a video film, television and press interviews, displays at public events, presentations in schools etc.

The LIFE project and all connected program represents a cost of about 10 000 000€, for 10 communes and about 5000 inhabitants. No other global program has been so important in France.

The application of the Directive Habitat has led the Syndicat to be operator for the co-ordination of the French Natura 2000 document, in a large commission of 60 organisations. The document has been now approved by the commission.

Some of conflicts that have been faced have included:

- Agriculture conflicts : how to stop or to reduce fertilisation
  how to increase the water level
- Landowner conflicts : how to manage their properties for biodiversity

Workshops have been held at which each group had to try to understand the objects of the other one. The Syndicat had to find financial bonuses to help some farmer or some landowners to respect ecologic wetland management of the Drugeon valley.
10 years have been necessary to install trustfully relationships.

From the 2nd of February 2003, the Drugeon valley is now an international **Ramsar** area and this is the best recompense that our Community could receive.

The Community of communes employs three staff, who will be key in providing the information for the documentation of this study site. These are:

Genevieve MAGNON/PETIT-MAIRE: specializing in policy of territories and hydrobiologist, is the principal operator for administrative, financial and technical projects.

Jean Noel RESCH: specialising in river recreation (hydrobiologist), is responsible of the hard works of the recreation of the river, and all de scientific regular of the water (fish, benthos, quality)

Michel Sauret: specialising in wetland management. (technician) is responsible of cutting the grass in the wetlands and for the horses.

Romanian Institutional building in management of wetlands with special focus on the coastal zones. Ethical issues.

Ioana Ispas – University of Bucharest

Wetlands have become a sign of progress of human populations. The balance between use and abuse of wetlands indicates the degree of development of a society. More and more frequently and in an increasing number of countries, wetland management and restoration forms part of environmental and development policies, especially in the rural environment Countries with greater economic capacities have set up strategies to conserve and manage wetlands and in countries with lesser economic capacities, particularly in the tropics and subtropics, numerous international bodies contribute with the same purpose: to integrate the conservation and management of wetlands into the social and economic development of human populations. This does not mean that there is only one approach or a single methodology by which to conserve and manage wetlands, but there *are* some basic principles and experiences throughout the world that show the successes and errors in wetland management, particularly in the use that can be made of them, depending on the functions for which they are intended. .In this context is very important to have an institutional building for naturally developing of environmentally aspects. As a general effort for EU integration, Romania has developed its legislation and the article consist of a general overview about advantages/disadvantages derived from this regulations and some ethical issues regarding the antropocentric and life centered systems in environmental policy.

General characterization of Romanian legislation

Romanian's regulations are represented by: laws, emergency ordinance, decrees. A major part of them represents the implementation of main EU Directives in this field.**-Until 2003** there were adopted regulations regarding:

- Free access at the information concerning with environment;
- Prevention, and integrate control of pollution;
- Integrate management of costal areas;
- Management of waste

The responsibility for protection and administration of the protected areas belongs to the Central Authority of Environmental Protection (Ministry of Agriculture, Waters, Forest and Environmental Protection) which is the main authority in this field.

Main regulations

The presentation has focused on the short description of the following regulations:

- Decree 297/13 March 2003 regarding organising and functioning of the National Guard of Environment
- Emergency Ordinance 202/2002 regarding integrated management of costal areas
- Law 137/1997 regarding environmental protection
- Emergency Ordinance 236/24 November 2000 regarding the status of protected natural areas, conservation of natural habitats, wild flora and fauna.
- Decree 248/27 May 1994 for implementing of the Emergency Ordinance 202/2002 regarding management of costal area
- Law 137/1997 regarding Environmental protection
- Law 82/1993 regarding foundation of Danube Delta's biosphere reservation.

Coastal protected natural areas –International legal framework

Romania is party to the following international agreements:

- Convention on the Territorial Sea and the Contiguous Zone, Geneva, 1958;
- Convention on the Continental Shelf, Geneva, 1958;
- Convention on the High Seas, Geneva, 1958;
- The Danube River Protection Convention ,1984;

- Convention concerning fishing in the Black Sea, Varna, 1959;
- Agreement Relating to the implementation of Part XI of the United Nations Convention on the Law of the Sea, New York,1994;
- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1989)
- The Antarctic Treaty , Washington, 1959;
- Protocol to the Antarctic Treaty on Environmental Protection, Madrid, 1991;
- Agreement concerning co-operation in the North-West Atlantic Fisheries, Ottawa, 1978;
- United Nations Convention on the Law of the Sea, Montego Bay, 1982;
- Strategic Action Plan for the Rehabilitation and Protection of the Black Sea, 1996;
- International Convention for the Prevention of Pollution from Ships, London, 1973;
- Protocol of 1978 relating to the International Convention for the Prevention of Pollution from Ships, London, 1978

Main coastal wetlands:
There were presented the main coastal area from Romania:

- **Danube Delta** (major national and international ecological area under protection of the law 82/1993).
- **Lake Sinoe** (from Razim-Sinoe lagoon complex)-with permanent connection with marine waters(length 9,5km, maximum depth 3,2m).

Problems and constrains for the development of coastal areas

The last part of the presentation was focused on the problems and constraints for the development of coastal areas and some ethical issues –in terms of sense of anthropocentric life centered systems views. The problems which were identified were:

- Existing national legislation is incomplete for the achievement of sustainable development;
- National legislation and development policy still do not give, in practice, priority to coastal zone;
- Absence of a legal definition of the National Coastal Zone Boundaries;
- Regional and/or local regulations related to market economy are inadequate or absent.
- High pollution and degradation of coastal resources including beaches, special habitats, biodiversity and coastal tourist area;
- Coastal erosion;
- Inefficient control of illegal building in coastal areas;
- Undeveloped aquaculture;
- Regression of tourism;
- great number of competing and conflicting users in the coastal area;

The monitoring and pollution control system is not sufficiently equipped and efficient;
Absence of adequate institutional arrangements for coastal protection against erosion and protection of especially valuable areas, with the exception of the Danube Delta.
Ethical issues

Can we draw a line between life and human centered systems?

It was analysed as example: Proceeding on regulation of economic and social activities having an environmental impact (the Ministry Order no. 125/1996, modified by Ministry Order 184/1997).

CASE STUDY 4: THE BIEBRZA NATIONAL PARK, POLAND

Hubert Piorkowski[1]

Introduction

The Biebrza river valley is located in northeastern part of Poland. Its current relief is related to the last Pleistocene glaciation. In front of the edge of the Vistulian ice-sheet fluvioglacial waters used to cut wide and deep landscape form running from Vilnus and Grodno to Berlin. The eastern unit of this significant element of the European landscape is named after the Biebrza River.

During the Holocene period marginal valley has been accumulated with different types of peat deposits and became one of the largest fen area in Europe. Nowadays it covers approximately 9200 km^2 and stretches from north to the south for about 100 km.

According to morphological and hydrological conditions Biebrza river valley is divided into three landscape units, so-called basins. The morphological and hydrological differences are followed by other elements of the landscape and results in highly diversified landscape system.

For centuries farmers managed Biebrza marshes and the flood plain. Their activities focused mostly on mowing wet meadows for straw or for bedding. Due to this type of management, some parts of peatland plains has been drained. Vast areas along the river were used as pastures. Thus – semi-natural Biebrza ecosystems originate from the extensive agriculture. Nowadays Biebrza river valley contains more than 60 plant communities. Almost 900 plant species occur in the region: 45 of them are endangered in the national scale (National Red List), 53 species are protected completely (18 different species of orchids), 13 – partly. Wetlands attract more than 180 nesting bird species while 271 bird species has been reported from the valley. Also 48 mammals species, 12 species of amphibians, 5 species of reptiles and 37 species of fish occur in Biebrza region. Biebrza is an important resting place for migratory birds. It is considered as a refugium for endangered mammals (e.g. elk, otter, wolf) and function as an ecological corridor of international importance. Biebrza marshes attract almost 600 species of beetles, nearly 800 species of butterflies, 448 species of spiders and plenty species of other invertebrates (so far 339 species has been reported within this relatively least known animal group).

The short description of the Biebrza landscape system reveals two issues of great importance for maintenance of its natural values:

- Biebrza wetlands have to be considered as highly diversified, heterogeneous system,
- current uniqueness of Biebrza wetlands originates from long lasting co-existence between human and nature.

Protection status

An idea of Biebrza marshes protection originates from the beginning of XX century – Red Swamp Reserve in the middle basin, has been established in 1930. During late 60's the idea gained large scale and more complex approach but only in 1989 Biebrza valley was included, as a landscape park, into a national system of protected areas. This form of nature protection tolerates different types of human activities including, in some extent, agriculture and forestry. Due to domestic and international efforts (e.g. WWF support) in 1993 the next step towards better protection of the Biebrza river valley was done – the area got national park status – the highest within Polish nature protection system. Currently the Biebrza National Park (BNP) covers almost 6 000 km^2 and should preserve mire ecosystems, rare or threatened plant and animal species, plant communities, landscape values and biotopes especially important for awifauna. In 1995 Biebrza river valley was included into the list of Wetlands of International Importance completed by Ramsar Bureau. Biebrza river valley has been proposed as Nature 2000 area.

[1] Institute for Land Reclamation and Grassland Farming (IMUZ) at Falenty, Regional Research Centre in Bydgoszcz, Ossolinskich 12, 85-093, Bydgoszcz, Poland

Threats and the most important problems of the Biebrza river valley

Although finally Biebrza marshes have proper protection status reflecting its continental and even global significance, there are still many problems to maintain unique natural values of this area. The most important threats with short comments are placed below.

Changes in plant communities and site conditions: Comparative studies based on vegetation data from early 70's and current one as well as remote sensing analysis focused on changes of land cover types show considerable changes in vegetation structure. Significant changes in plant communities are related to: scrub succession, reed succession, increasing number of nitrophilous plant species and declining number of wetlands with low sedge communities through replacement by tall sedges, herb vegetation, low productive grasslands and reedbeds. Two main reasons are supposed to be responsible for current situation. The first one is related to the lack of management – mowing and constant annual biomass removal is crucial for minerotrophic fen ecosystems, while elimination of young stands of trees and bushes provides open landscape. The second factor is connected with eutrophication and decreasing soil moisture capacity.

Changes in water regime: Recent studies on hydrology reflect temporal and spatial decrease of annual spring-floods while studies on organic soils moisture capacity often reflect over draught of soil upper layers. Both processes are related to still existing drainage effect, additionally stimulated by dry years of last decades. Changes in water feeding are noticeable and follow changes in water regime.

Changes in bird population: Large-scale changes observed in habitat levels, vegetation structure and management practices lead to disturbances in populations and behavior of waders and other migratory birds.

Inaccessibility of area: The area of the BNP demands large-scale approach focused on active nature protection (e.g. restoration projects, mowing etc.), research programs and monitoring. Such activities in vast wetland areas are usually very expensive, involve many people, need logistic support and good co-ordination, thus often cause problems and difficulties for effective management.

Land abandonment and changes in management practices: Declining economy of small farms in Biebrza region (low income from low productive wet meadows), more general demographic trends occurring in north eastern part of Poland (e.g. emigration) and difficult natural conditions for agriculture lead to land abandonment process followed by changes in traditional management practices.

Agriculture on surrounded uplands: Farmers from surrounded uplands and from villages located within the park, due to raise life standards, in the nearest future could change its farms into more intensive agriculture activity (both: crop and animal production). The additional manure input through fertilizing arable lands and enlarging cattle herds may seriously stimulate eutrophication.

Changing people attitude towards wetlands: Although ecological awareness rising takes place and may be considered as a continuous process, still a lot of attention and efforts has to be put on this subject.

Conflicts with local communities: The structure of the ownership within BNP, where more than 60% of the area belongs to private owners together with often unclear ownership status of many parcels and with enormous numbers of individual owners cause interference with proper and coherent nature oriented management as well as generate conflicts of interests. Also direct neighborhood of nine administrative units demands many efforts to work out the best and generally approved compromise solutions focused on regional development and nature protection. Some problems are also related to poaching, illegal fishery and contributions for damages caused by beavers, roe deer and boars.

Infrastructure improvement: For last few years many efforts has been put to provide villages and towns in the vicinity of BNP with effective sewage systems, water supply systems, sewage treatment plants and environmentally friendly heating systems. Some important, urgent tasks and investments still remain and have to be done.

Transport: Vast area of BNP might cause serious conflicts with regional development strategies particularly connected with transport network.

Tourist activities: Efficient, optimized and coordinated tourist activities supported with reasonable promotion actions focused on different target groups are essential.

Toward sustainable development in Biebrza region

Although all above mentioned problems and tasks related to well organize nature oriented management in Biebrza marshes are addressed mainly to the authority and service of BNP, also other parties and organizations join efforts to gain these goals. The following different activities have been undertaken so far in order to solve most crucial and urgent needs mentioned above.

Within the framework of management plan maintenance open areas through mowing and shrub cutting is realized. Since 1999 almost 1000 ha has been mown and about 500 ha shrubs has been cut. In order to enlarge total managed area special harvesters has been bought by BNP.

Among other activities and projects carried out by BNP staff the following could be pointed out as the most important for solving ecological and social problems:

- experiments focused on reed vitality and resistance on mowing,
- permanent key bird species monitoring (e.g. aquatic warbler),
- large herbivores monitoring program (e.g. elks),
- hydrological monitoring focused on ground water level measurements and river outflow measurements,
- completion of BNP flora,
- research programs on invertebrates (e.g. butterflies),
- website maintenance with update information,
- organize workshops, conferences, symposia on topics related to nature protection in wetlands,
- organize annual events (e.g. Ramsar Day, Earth Day),

Biebrza National Park takes part in numerous scientific projects leading by academic institutions from Poland and abroad. Biebrza river valley as well as the whole region is often chosen as a reference area for many projects related to ecology, hydrology and geography. Some examples of recent tasks undertaken with participation of BNP are listed below:

- application of remote sensing in identification of scrub encroachment process,
- application of remote sensing in identification of temporal changes in landscape structures,
- delimitation of flood ranges,
- modeling ground and surface water conditions,
- distribution and modeling of nitrogen migration in ground and surface waters,
- application of satellite images in soil moisture analysis, vegetation structure analysis, vegetation reflectance analysis,
- large herbivores ecology,
- ecology and population dynamics of certain bird species,
- work out Management Support System based on GIS, Remote Sensing and modeling

Co-operation between Biebrza National Park authority, non-governmental organizations and local authorities is focused on rising ecological awareness in local communities and providing them with tools improving economic situation (e.g. agro-environmental schemes, agro-tourism). The most active non-governmental organizations are: WWF, Workshop of Living Architecture, Biebrza Society. Among other activities, they help to:

- establish local free of charge magazine distributing in local primary and secondary schools,
- organize training courses for local guides,
- stimulate regional initiatives promoting regional products based on traditional handicrafts (Polish Open Marsh Meadow Scything Championships for Nature, Local Product Trade Fair entitled ‘100 Ideas for Biebrza’)
- support BNP staff efforts to keep wetland areas open (restoration projects),
- support BNP to work out sustainable development in Biebrza region,
- organize and finance projects focused on chosen bird or plant species,
- provide local communities with tools and knowledge stimulating local/regional, environmentally friendly development (agro-environmental schemes, agro-tourism),
- distribute update information about Biebrza National Park,

– raise money for projects focused on special tasks (e.g. some examples).

Questions that still have to be answered

In spite of given examples many questions related to the basic issues of environmental policy in the management of wetlands could be addressed. The first one is whether the active protection approach within national park is really necessary and correct considering ongoing ecological processes? Next question deals with effectiveness and feasibility of restoration projects. There is also an important problem of validation and applicability methods of active protection or management of open wetlands. Another basic task focus on restoration and then maintenance long term and effective traditional wet meadow extensive management. And finally – how to establish the most effective and complex co-operation between all sides interested in nature protection.

WETLANDS AND LARGE HERBIVORES

Jozef Keulartz & Irene Klaver

1. The Oostvaardersplassen: past and present

The Oostvaarderplassen is a landscape with a remarkable history. It is part of Flevoland, the last of the polders that had been created in the former Zuyderzee (in 1957). After it was drained it laid fallow for years due to an economic lull and a marshy landscape evolved in the lowest area, that had been earmarked for industry. Before the planned industrial park could be build, planners were faced with something unexpected: nature. The area involved, called the Oostvaarderplassen, soon developed into a perfect habitat for plant and bird species associated with a more natural landscape.

The Oostvaarderplassen covers an area of about 5600 hectares, mainly open waters, reed and marsh woods. Nowadays the management of the Oostvaarderplassen is mainly directed at the creation of a complete marsh ecosystem in which natural processes can develop freely. An additional management goal is the preservation of the Oostvaardersplassen as habitat for international important bird species, such as goose, herons, stilts and spoonbills. To perform these tasks large grazing animals were introduced to this area.

Salt marshes, mudflats, and other coastal plains have been grazed for many centuries. In most of these areas in the Netherlands, this tradition continues today. The primary reason for grazing from a nature management perspective is that it controls the influx of herbage on the drier parts. The vegetation that is typical for this landscape from halophilous plants to plants, which help reduce the salinity of the soil, is thus preserved.

In 1983 and 1984, 34 Heck oxen and 20 Konik horses were introduced in the Oostvaardersplassen. In 1992, 56 red deer were added. Since then they have reproduced considerably. The area now includes 650 Heck cattle, 650 Konik horses and 750 red deer. Moreover, 50 roe deer have settled the area themselves. The Heck population is the largest herd of cattle living in the wild in Europe, and the Konik population is one of the largest 'unmanaged' feral horse populations in Europe.

There are serious plans to create a robust ecological corridor of about 2000 hectares to connect the Oostvaarderplassen with the Veluwe, an area of about 90.000 hectares of sandy soil. This is mainly meant to accommodate the red deer. At this moment the red deer is confined either in the wet Oostvaardersplassen (normally their summer residence) or in the dry Veluwe (normally their winter residence). But not only the red deer will profit from this corridor – it will facilitate the emergence of more species and an increase of the existing populations.

	Veluwe	Oostvaarderplassen
Area in hectare	90.000	5.600
Red deer	1000	750
Roe deer	3500	50
Wild boar	1500	0
Fallow deer	185	0
Cattle	150	650
Horses	150	650

One of the largest challenges for the near future is the population development of the herbivores in relation to availability of vegetation (both qualitatively as well as quantitatively). Also the habitat required for (migratory) birds might become problematic. Given the constant increase in grazing intensity there is the continuing risk of food shortage. The number of 'small grazers' (especially goose) is very high, while the herds of horses, cattle and red deer have grown considerably over the last years. It seems that the carrying capacity of the area has reached its limits: the condition of the animals, especially of the Heck cattle, declines in the winter and the early spring, which results in growing numbers of starving animals. Time and again this situation provokes fierce protests from local people all the way to national parliament.

2 The controversy between animal protectionists and nature conservationists

There is an ongoing debate in the Netherlands between animal protectionists and nature conservationists about the moral problems associated with the introduction of large herbivores in newly developed nature areas. The introduced herbivores are basically domesticated species that are derived from hoofed animals that were once wild, such as cattle, horses, sheep, and goats. Konik horses and Heck oxen represent a special subcategory in this group, since they are meant to also "function" as semi-wild surrogates for such extinct species as the Tarpan and Auroch. Most of them come from farms, zoos, or small parks, in short, from domesticated backgrounds. Introduced into relatively "wild" areas, they are subject to a process of so-called "de-domestication", that is, they have to learn to fend for themselves. The management policies of de-domestication, which entail minimizing supplementary feeding and veterinary assistance, have been most controversial.

Most controversies involve the "domestication status" of the animals: should they be seen as (still) domesticated or as (already) wild? While the majority of the animal protectionists, farmers, and visitors view the introduced horses and cattle as domesticated animals to be cared for as individuals, most park rangers, herd managers and ecologists prefer to treat them, ethologically and ethically, the same as wild animals. This polarized debate between animal protectionists and nature conservationists is reflected in environmental philosophy in the debate between individualistically oriented animal welfare ethicists and holistically oriented eco-ethicists. Hence they don't offer a way out of this stalemate. As a result of this discord, people exhaust themselves in unproductive boundary disputes in which both sides claim an exclusive "moral jurisdiction" over large herbivores.

We strongly believe that there is a way out of this impasse by replacing the notion of a clear-cut borderline between nature and culture with the idea of a broad continuum, a hybrid middle ground, in which it is no longer a question of "either-or" but of "less or more". Herbivores introduced in nature areas don't simply cross a distinct dividing line between culture and nature; they don't walk from domestication into the wild, that is, from a moral domain of individual care to one of concern for the ecological whole. Instead, they gradually move from a thoroughly cultural context to one that is increasingly natural.

To do justice to the gradual character of de-domestication, we have introduced a new ethical notion with regard to the treatment of large herbivores in newly developed nature areas: the principle of "respect for potential wildness". Emphasizing the *potential* aspect of wildness concedes a capacity for wildness, while at the same time acknowledging that de-domestication is a dynamic process with an uncertain and unpredictable outcome. In such a process, both animal welfare ethicists and eco-ethicists will be indispensable. We have launched this new ethical concept explicitly with the pragmatic intention to overcome the deadlock in the debate between advocates and opponents of the Dutch herbivores introduction program.

FLOOD INSURANCE AS AN INSTRUMENT OF ENVIRONMENTAL POLICY

Anna Łasut

Abstract: This paper examines changes in flood policy arising through the implementation of the Water Framework Directive in European Countries as well as the costs of these changes. Flood insurance is presented as a useful instrument of the environmental policy among the non-technical flood defence measures. The benefits as well as the costs of such an instrument for the local stakeholders and government are presented.

Introduction

Flood insurance, although previously neglected as an instrument in fighting flood damage, is at present gaining importance. There are discussions in many European Countries concerning the usefulness of insurance for the benefit of residents and government. A flood insurance system on a European scale can bring savings in the government expenditure which are inevitable in natural catastrophes. At present a common European policy with respect to the flood insurance does not exist, although flood risk can be voluntary insured together with other risks in insurance packets.

First, I would like to describe changes in flood policy connected with the implementation of the Water Framework Directive, which defines European water policy in general. Than the actual role of flood insurance as a useful instrument of environmental policy in flood mitigation, will be discussed. Next, I will focus on the economic advantages and costs of flood insurance for local stakeholders as well as for government that will finally enable some conclusions about the usefulness of such an instrument under European conditions to be identified.

Changes in flood policy due to implementation of Water Framework Directive

The Water Framework Directive aims to achieve sustainable water quality and protection of water ecosystems. One of its objectives within an integrated water policy is protection from flood and drought. The measures to achieve this aim are not specified in the document, but it is understandable that they have to be adapted to River Basin Management Plans. Therefore it is necessary that strategies must be planned and negotiated at an international level in order to be effective. It would be useful to integrate flood insurance policies within Europe and at the base of existing measures in every country measures and it would be advantageous to create a common flood insurance protection instrument. Flood insurance is also fulfilling other objectives of the Directive such as: active participation of society, integrated trans-boundary water management system, etc. The below table presents the most important changes implemented by the Directive with respect to flood and drought problems and anticipated results of these changes.

Table 1. Changes introduced by the directive

Range	**Actions**	**Results of changes**
Protection from flood and draught results	Development limitations resulting from water scarcity and flood threads are most significant for the local development plans.	❖ Changes in law preventing investments in floodplains.
	Creation of flood protection programmes.	❖ Identification of areas threatened by flood.
	Creation of draught protection programmes.	❖ Identification of areas threatened by draught.

Local development plans	Change to a local development plans with respect to building areas.	❖ Local development plans are to be consulted with general public and local government.
Environment (ecosystems)	Renaturalisation	❖ Use of natural method of river regulation, wherever possible. ❖ Lack of interference in the natural river flow.
International and local cooperation	With regard to the unsolved by a country problem, which influence the water management	❖ Presentation of a problem to the European Commission and to the interested Member Country together with recommendations concerning solution. ❖ Commission takes a stand within 6 months
	On the border's water	❖ This cooperation is specified in agreements between interested partners.
	Information for general public and social consultations	❖ Organisation of information meetings and consultations already at the stage of creation of plans. ❖ internet use
	Between national and local administration	❖ Development of technical and information systems enabling cooperation between different databases. ❖ Water management in connection with development planning.

Source: own work at the base of the Water Framework Directive

Protection from the results of flood and drought can proceed by the means of two different development strategies. The first, an ecological strategy, consists of the adaptation of investments to the climate conditions. The second, a technological one, aims to shape the water resources in order to remove climate and hydrographical restrictions, by the means of such measures as: irrigation, drainage, dikes, embankments, etc. Drawbacks of the second strategy include:

- high costs of hydrological investments, which are only partially successful;
- insufficiency of hydrological infrastructure, that is confirmed by flood results from recent years;
- destruction of ecosystems through river regulation and retention reservoirs, that limits the ability of self-purification of water and increase river bed erosion.

The Directive recommends limited use of technological strategies and only when social development is impossible within ecological strategies.

How can flood insurance be an instrument of environmental policy?

Flood insurance can be defined as the voluntary or mandatory insurance of property. Insurance rates and yields depend on the use of flood risk maps. Such flood protection is not common in Europe, whereas in United States National Flood Insurance Programme has been in operation since 1968. It was created in response to the rising costs of taxpayer-funded disaster relief for flood victims and the increased amount of damage caused by floods. The program helps to solve several problems connected with flood damage, existing at present in European Countries. The main idea of flood insurance programme can be summarized in the following points:

- establishing an insurance program as an alternative to disaster relief;
- distributing the responsibility for floodplain management to all levels of government and private sector;
- setting a national standard for regulating new development in floodplains;
- beginning a comprehensive floodplain mapping program.

The idea of flood insurance is in accordance with European environmental policy as it can be derived from the Directive. Moreover flood insurance is the instrument which helps to implement the practical

changes brought by the directive and stated in Table 1. The important function of flood insurance as an instrument of environmental policy is the participation of local authorities, while insurance is available in communities that agree to adopt and enforce floodplain management regulations to reduce future flood damage. A community supervises building activities in the floodplain that prevents careless building.

Flood insurance will gradually have a more important role in the future as a protective measure as well as an instrument of decreasing expenses of the national budget after a catastrophe. In some countries governments interfere with the insurance system by introducing mandatory insurance for threatened residents or by offering subsidies or guarantees to the insurance companies in order to encourage people to this form of protection, because of a lot of benefits it brings. However, people are still reluctant to this form of protection, especially in areas rarely flooded. They prefer to transfer the whole responsibility as well as actions to the central government.

According to the experiences of many countries and especially United States it is impossible to prevent the risk of a catastrophe using technical methods. Therefore so called non-technical methods of prevention against flood, such as: legislation, taxes, education, early-warning systems, are gaining more attention from government. In European macroeconomic policy the central budget has already too much liabilities and expenditures, so every additional expenditure put a thread to the economical balance of a country. It is than very important to search for different sources of financing these losses, engaging local authorities or residents.

Among others floodplain management strategies and tools flood insurance is paying a significant role in the USA in assisting individuals and communities to prepare for, respond and recover from floods. They help to modify the impact of flooding, whereas other tools are essential for different further strategies such as: modifying the flood itself by developing projects that control floodwater, preserving and restoring natural resources.

What are the benefits and costs of the flood insurance?

The benefits as well as the costs of flood insurance can be illustrated by the example of National Flood Insurance Programme (NFIP) operating in USA and they are as following:

- reduction of flood damage

The beneficial reduction in flood damage, where flood insurance is concerned, arises because of community regulations imposed to enable participation in the flood insurance program. The decrease in central budget expenditure to compensate for unpredictable natural disasters and higher insurance premiums within the threatened area will prevent people from building there.

- community participation and costs sharing

If the community as a whole does not mitigate the flood hazard adequately, the potential for loss will not be reduced sufficiently to affect disaster relief cost. Insurance rates also would reflect the probable higher losses resulting without local floodplain management enforcement activities. Community participation in the NFIP is voluntary, although some sates require NFIP participation as part of their floodplain management program. The first requirement for effective flood insurance system is mapping. After mapping flood areas the maps should be available for local authorities for decision making with respect to local development plans.

- investments

Flood insurance encourages state, local and private programs and projects that preserve or restore the natural state of floodplains and protect their functions.

- environmental protection

The most important function of flood insurance is mitigation of the causes of natural disasters using sustainable measures without interfering into natural river ecosystems, unlike technical flood defences methods. When the floodplains are used for rural and industrial purposes they lose their natural flood protecting function. The program also encourages communities to coordinate their flood loss reduction programs with Habitats Conservation Plans as well as other public and private activities that protect natural and beneficial floodplain functions.

- economical study of local development

Each identified flood-prone community must assess its flood hazard and determine whether flood insurance and floodplain management would benefit the community's residents and economy. The detailed economical analysis indicating all alternative costs of retention and rural or industrial use of floodplains should follow.

- profitability

The program is self-supporting, which means that operating expanses and flood insurance claims are paid through premiums collected for flood insurance policies.
A conflict of interest between floodplain land owners (securing own benefits) and the community can occur. It can be solved by implementing measures (i.e. flood insurance), which will make the use of floodplain for flood protection purposes economically justified for their owners. This idea corresponds with the Water Framework Directive, which gives priority to human and public interests. This can be achieved by imposing mandatory flood insurance for investments within the floodplain which will discourage further business and development activities there.

The main costs are associated with the organisation and implementation of the system, risk assessment, law changes, map designs, etc. Other costs are with respect to maintenance of the project: personal costs, costs of compensations due to flood damage, etc. The detailed economical studies should be conducted within chosen floodplains concerning alternative cost to its flood protective use.

Conclusions

When investigating different national solutions to the flood problem among several European Countries several conclusions have to be drawn:

- European insurers have similar problems connected with flooding to those in the USA and they are now searching for proper solutions.
- There are some solutions to these problems already implemented in the USA and constantly improved there, which, with necessary modifications, could be used in Europe.
- There is a need for modern, non-structural measures to be used against flooding in Europe and countries have already been trying (with changeable results) to implement different legal restrictions and financial supports.
- There must be an initiative and the measures taken at the European level due to the scale of the phenomenon,
- Insurance can help to solve also other problems such as disintegrated farming by cheaper insurance for the joint farmer applications.
- Insurance develops awareness of flood defences among the society.
- Within a flood insurance system, government interference in planning and protection measures allows joint governmental and residential responsibility.

There are some cross-disciplinary questions to be answered before the flood insurance can be beneficial in Europe, such as:

- What is the added value of the natural flood defence? (eco-tourism, inhabitants protection)
- Who should pay for the defence measures? (generally floodplain residents are not wealthy)
- What should be done with floodplains already inhabited?
- How to deal with the trans-boundary issues?
- What is a role of European legislation in realizing natural flood defence?
- How do user functions and land use change as a result of natural flood defences?
- How to create effective social commitment and public awareness?
- How to establish balance between beneficial development and flood protective function of floodplains?
- What should be a management of assets and liabilities within the program?

References

Benfield Greig Hazard Research Centre, January 2003, *Flood Risk and Insurance in England and Wales: are there lessons to be learned from Scotland?*, 2003 [report in English]

European Parliament and European Council, 2000 - *Water Framework Directive*, October 23, 2000.

French W., 2002 - *Managing Floodplain Development Through The National Flood Insurance Program FEMA Home Study Course IS-9; Floodplain Management Home Study Course*, (www.floods.org) [book in english]

Kunreuther H., 1998 – *Paying the Price: The Status and Role of Insurance Against Natural Disasters in the United States*, Washington, D.C., Joseph Henry Press. [book in English]

Kunreuther H., Linnerooth-Bayer J., 1999, - *The Financial Management of Catastrophic Flood Risks in Emerging Economy Countries*, Conference on Global Change and Catastrophic Risk Management, Laxenburg, Austria, IIASA, June 6-9, 1999. [conference paper]

Trilateral Co-operation of Non-Governmental Environmental Organisations in the Austrian-Slovak-Czech Areas of Ramsar-Sites Wetlands

Jaroslav Ungerman
Union for the Morava River

Introduction

Despite all human interferences, with their degrading impacts (or rather devastating impacts on the Czech side of the border) on bottomlands of lower courses of the Morava and Dyje Rivers within the last century, the remaining preserved original segments of these bottomlands, with their precious ecosystems, are still worth protecting. Localities which have not preserved in their original state should be reclaimed and revitalised. But at the same time, it is also necessary to draw public attention to these ecosystems (unique in Central Europe) and make selected localities accessible to the general public. The public should be constantly reminded that all biologists and other natural scientists in former Czechoslovakia had unsuccessfully confronted scandalous state-run water-management projects in Southern Moravia (the south-eastern part of the Czech Republic) between 1970-1989, when some unique natural systems were destroyed. 1000 hectares of floodplain forests, 500 hectares of wetlands and approximately the same area of alluvial meadows were (forever?) flooded by water of the Nove Mlyny Reservoir on the Dyje River. Wonderful original sections of the Morava and Dyje Rivers on the border with Austria and Slovakia were transformed into canals. These adjustments practically destroyed natural water regime of by then regularly-flooded bottomlands in Southern Moravia.

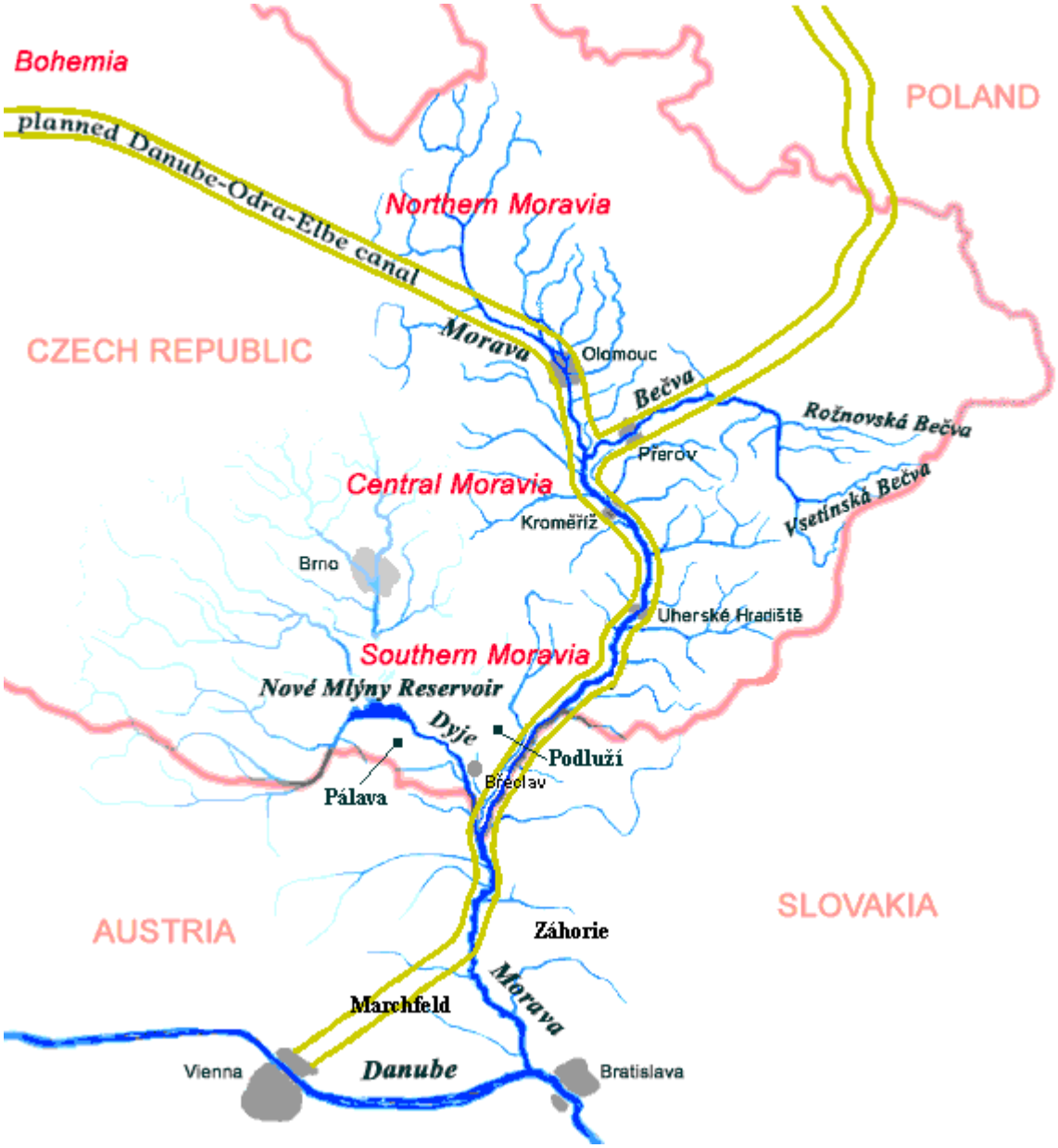
The Beginning of the Trilateral Cupertino

Close ties between Czech and Slovak conservationists had already existed before the split of Czechoslovakia in 1993. In the late 1980s, first Czech-Austrian co-operation attempts already started up despite the existence of the Iron Curtain. At that time, conservationists from Brno (a city in Southern Moravia, 50 km from the Czech-Austrian border) had already been issuing a magazine called VERONICA, which exceeded the usual environmental content by taking a more ”cultural” stance. The VERONICA magazine drew attention of Vienna environmentalists, who then helped to organise an art exhibition of artists contributing to the magazine. The exhibition in Vienna was an important and visible event marking the beginning of close professional as well as personal relationships between Czech and Austrian conservationists, which gathered strength after the political changes in Eastern Europe in 1989.

The ”Environmental Building Stone for the Common European House” Project

Due to already established collaboration, its was natural that after 1989, Czech conservationists joined their Austrian and Slovak colleagues in a positive-sounded project named *The Environmental Building Stone for the Common European House* – a project with high ambitions and great wishes: achieving the establishment of a natural park comprising the floodplains of the Morava and Dyje Rivers and the confluence of the Morava and Danube Rivers - on the territories of the Czech Republic, Austria and Slovakia. The bold plans of that

time were not realised though; nevertheless, deep feelings and pleasant memories of events accompanying the project still persist. Just let me describe one personal story of mine that happened during an excursion to the floodplain of the Morava River on the Austrian side of the border – a traditional folk band VERONICA (named after the ecological organisation), composed of ecologically-minded musicians and accompanied by their friends from ecological organisations from Slovakia, Austria and the Czech Republic, reached the confluence of the Morava and Danube Rivers where it symbolically played and sang to these rivers.



DISTELVEREIN, DAPHNE and VERONICA – Partner Organisations

In spite of the fact that the original high ambition of the above mentioned project was not met, the enthusiasm has persevered and transformed itself into more rational working procedures and more down-to-earth goals.

In Austria, conservationists, farmers, hunters and fishermen started up an organisation called DISTELVEREIN, thus ending a ”trench war” waged between the interest groups during activities related to the protection and ecologically-sound utilisation of bottomlands. First leader of the organisation, Dr Carl Manzano, later became director of the Danube-Auen National Park. DAPHNE - Institute for Applied Ecology (a non-governmental organisation) has been working in Slovakia for many years, asserting its place amongst established state-run ecological institutions. Both DISTELVEREIN and DAPHNE have already managed to realise many national projects with concrete results.

The VERONICA Ecological Institute, a team of professionals within the Czech Union of Conservationists, was and still is in a rather different position than DAPHNE and DISTELVEREIN. The activities of VERONICA are more broadly based and the problem of bottomlands in Southern Moravia is just one of many activities VERONICA deals with. Therefore, taking account of the total degradation of the bottomland of the Morava River after its adjustment within the above mentioned water-management projects, it is necessary to put emphasis on revitalisation of biotopes of the floodplains and renewing the natural hydrological regime as the paramount condition.

A project called *The Ecologically-Sustainable Development of the Palava Protected Area*, run by VERONICA and financed from the GEF Biodiversity Program, was of a fundamental importance in the context of a considered enlargement of the protected area by parts of the floodplains of the Morava and Dyje Rivers (the Palava Protected Area lies south of Brno, close to the Nove Mlyny Reservoir and the Czech-Austrian border). Even though conclusions and recommendations set out in the project outlets are still to be implemented, the project goals still remain a priority for us.

The TRIALOG Project

DISTELVEREIN, DAPHNE and VERONICA met together on a work on a project called *The TRIALOG for Formulating Protection Strategy and Utilisation of the Bottomland of the Morava and Dyje Rivers*. The regional WWF Austrian office also participated in this project. The linkage and connection of Ramsar Sites between the states in the region was one of the cardinal points of the formulated strategy. The project was funded by the Government of Lower Austria, Interreg EU and WWF. An Austrian private company Allplan (specialised in environmental planning) was chosen to lead the project under our supervision. The project outlets summarise problems with the utilisation of the Morava and Dyje Rivers in the trilateral area and define a likely future direction of protection and development activities related to agriculture, water management, environment protection, forestry, tourism and infrastructure in the area. The voluminous final project report is a comprehensive material (in German, Slovak and Czech) reflecting the time when it was put out and it may form a basis for future conceptual considerations of international co-operation in the trilateral area.

Publication Activities

From all publications issued with the help of the organisations from the trilateral area, it is necessary to point out a German-language book called ”Fliessende Grenzen” (The Flowing Borders) written mainly by Austrian authors with some contributions from Czech and Slovak specialists. This book was issued in 1999. At the same year, another important publication named ”Alluvial Meadows of the Morava River – Importance, Renewal and Management” was published by DAPHNE, with texts parallel in Slovak and English. This book summarises

experience of its authors about the meadow management in the bottomland of the Morava River and experience from international collaboration.

Biosphere Reserves

Since 2000, our loose trilateral group of non-governmental organisations have been involved in attempts to form and declare three UNESCO biosphere reserves on the territory of each respective state, thus creating a chance to set up a single unit (formed by the three reserves) with the status of the international biosphere reserve sometime in the future. These activities are, to some extent, a reaction to the fact that our efforts to create a single trilateral international park at the first place were hampered by economic, communication and psychological barriers.

The most important shift towards declaring a biosphere reserve has been achieved in Austria, where a major discussion between the initiators of the reserve and the people who utilise the bottomland of the Morava and Dyje Rivers was held. Basic positions of both sides where made clear during the discussion and now there should be no obstacles to an agreement on a proposal about declaring the biosphere reserve on the Austrian territory.

There is a different situation on the Czech side of the border – a proposal on an enlargement of the current Palava Biosphere Reserve by sections of floodplains of the Dyje River had to be withdrawn due to insurmountable reservations of some participants during administrative proceedings. A variant proposal was subsequently worked out and this time with a positive result – an enlargement of the Palava Biosphere Reserve by the Podluzi area (this area lies to the east of Palava).

As far as the situation in Slovakia is concerned, outcomes of effort by non-governmental organisations related to declaring a biosphere reserve in the floodplains of the Morava River are still unclear. Various and still unofficial signals leaked from the state environmental circles suggest that the state authority has given priority in establishing biosphere reserves to other areas than the bottomland of the Morava River, which enjoys a status of a protected area (the Zahorie Protected Area).

Other Projects and Activities

The aim of this contribution was not to give a comprehensive report on activities going on within the trilateral collaboration. I was rather trying to refer to some aspects of selfless and supportive behaviour and Cupertino based on purely ethical principles. Nevertheless, let me mention here at least that as many as five trilateral conferences on selected problems of bottomlands were held, where the Union for the Morava River (a network of non-governmental environmental organisations) was representing the Czech Republic. I do not have space here for a full description and evaluation of successful projects in Austria (for example, *The Martha Revitalisation Project*, *EU LIFE 1* and *EU LIFE 2 Projects*) and Slovakia (for example, the renewed connection of once out-of-work meanders of the Morava River and arranging a natural trail in the bottomland of the Morava River). Nor have I space for describing successful as well as unsuccessful projects in the Czech Republic, such as the shameful situation around non-realised ”ecologisation” of the Nove Mlyny Reservoir in Southern Moravia, where a local authority sold its land around one part of the reservoir to a private body. This land was to be singled out for a ”biocentre” and a habitat corridor.

Danube-Odra-Elbe Canal

The Danube-Odra-Elbe (DOL) canal project has recently emerged again, and a strong pressure has been brought to bear to build up parts of the canal. The building of the Vienna - Breclav section of the DOL canal together with a port in Breclav (a town in Southern Moravia) as a part of a multimodal transport junction has been included into the Strategic Development Plan of the Southern Moravian Region. The canal should be directed from Vienna through Marchfeld (Moravian Field) to Breclav and then continue further north using a brand new route - that means that the riverbed of the Morava River on the Czech-Slovak border, which was ”canalised” for that purpose after 1970, will not be used that way. The Zlin Region included (in connection to the above mentioned activity of the neighbouring Southern-Moravian Region) its version of the canal extension to Prerov (a town in Central Moravia) to a similar development plan with a port to be built up there. The Northern Moravian Region is involved in similar planning activities on the Odra River.

With continuing development of these concrete plans to build up the DOL canal in the Czech Republic, the attitude towards the DOL project has been changing in Slovakia too. There are calls to direct the DOL canal through the riverbed of the Morava River on the Slovak side of the border as planned by the former communist regime in former Czechoslovakia. The main reason for this rather paradoxical development is a chance for Slovakia to reach money from EU funds which will be probably not accessible for Austria.

Conclusion

Besides utilising positive experience from the three ecological organisations, other ”allies” are needed for positive understanding of our aims to protect Ramsar-Sites wetlands in the described trilateral area – for example, local non-governmental organisations in the particular regions, local mayors, land owners and land users, representatives of local authorities and representatives of tourist information centres. It is necessary to look for other possibilities to enable even more efficient dialogue between all people who act and work in the bottomland of the Morava and Dyje Rivers. Ethical principles during decision-making processes (related to the above mentioned complex problems) must be an integral part of this dialogue.

Awarding the Ramsar Prize at the Ramsar Conference in Valencia, Spain in 2001 to DAPHNE, DISTELVEREIN and VERONICA – three collaborating non-governmental organisations, the initiatives of theirs were briefly presented at the conference, is a further commitment for work on protecting and further preservation of the precious wetlands.

Contact:
Union for the Morava River
Jaroslav Ungerman
Panska 9
602 00 Brno
Czech Republic
tel.: +420 542 422 755
fax.: +420 542 422 752
e-mail: jaroslav.ungerman@ecn.cz
URL: www.sweb.cz/uprm

The Ecosystem budget method as a tool to implement environmental policy for wetland – water quality relations

Marek Kruk[1]

The Ecosystem budget approach at a landscape and watershed scale is widely used in the research and management evaluation of forest (Bormann and Likens 1994, Waring and Running 1998) and agricultural (Lowrance 1995) areas. These types of ecosystems, situated in uplands, are very suitable for system delimitation and nutrient budget calculation. Furthermore, the approach allows precise assessment of land-water interactions, and the impact of run-off from watershed on water quality in particular.

Temperate wetlands, including riparian and inland, constitute a constant component connecting upland and water systems in many landscapes. Especially, they are broadly distributed in postglacial areas in North Europe and North America. The biogeochemical role of these ecosystems, transitional in space and time, has been an object of intensive research in recent decades mainly motivated by freshwater bodies' protection. The major interest of these studies was to calculate the retention potential of wetlands for N and P inflowing from watershed (Johnston 1991). The ecosystem budget method calculation was the dominant approach to assess the effectiveness of nutrient removal (Peterjohn and Corell 1984, Johnston 1991). Remembering this, it should be pointed out that wetlands, and northern peatlands especially, had been subjected to various, local and global, anthropogenic transformations (Gorham 1991). Hydrological transformations or modifications changed ecosystem structure and internal nutrient cycling, causing even contrasting turn in its retention and buffer role in case of N behaviour, in particular (Kruk 1997). Drained peatlands lost their capacity to intercept not only N and P, but also such environmentally dangerous elements as trace metals (Lundin and Bergquist 1990, Kruk 2000).

The article presented aims on evaluation, in sustainable management and water quality context, the benefits and losses caused by maintaining or transforming temperate wetlands, representing by inland peatlands complexes in lakeland Mazury Region in NE Poland. It should be emphasized, that wetlands in post-glacial areas in Europe cover nearly 5 – 15% of area, however 60 – 90% of catchment outflow in lakeland regions passes through peatland areas (Kruk 1999). Its role in maintaining water quality of lakes and rivers should not be omitted.

The study include various kinds of undrained and managed peatlands characteristic for present-day lakeland landscape of NE Poland. Namely, seven categories of wetland differ in trophic, hydrologic and land-use properties were examined for N and P budget calculation:

- Minerotrophic peatland (fen) without surface outflow
- Wetland with shallow lake with surface throughflow
- Transition bog without surface outflow
- Transition bog with surface troughflow
- Minerotrophic peatland directly drained
- Formerly drained peatland with meadow (midforest)
- Formerly drained peatland with meadow (pasture)

Using input-output ecosystem model (Mitsch and Gosselink 1993) it was demonstrated, that wetlands listed above vary in N and P retention, in total dissolved and particulate forms as well as in ionic substances NO_3-N and PO_4-P, the most responsible for eutrophication effect. The nutrient retention effectiveness was calculated as relation between yearly retention and input amounts, expressed in percent (see details in Kruk 1990 and 2000).

The calculation of retention effectiveness for wetland ecosystems studied surprisingly showed that it is hardly to find the most beneficial management situation or category of wetland, from water quality point of view. First, undrained minerotrophic peatland and transition bog retained about 70-85% of total N, including 95% of nitrates, but in the same

[1] *Department of Evolutionary Ecology, University of Warmia and Mazury, 10-957 Olsztyn, Poland, mkruk@uwm.edu.pl*

time, they lost more than 50% of incoming phosphates. Wetlands with shallow lake or transition bog crossed by watercourse were considered as typical throughflowing systems with almost equal amounts of inflowing and outflowing nutrients. Drained peatland were the most dangerous in exporting N and P forms into recipient water bodies: lakes and rivers. Directly drained minerotrophic fen lost even 70% of nitrates in first year after melioration. However, this leaching effect not concerned phosphates. Formerly drained peatlands can also loss nitrates, but first of all, they lost even 80 – 100% of total phosphorus input, mostly in organic and particulate forms. All drained peatlands examined not retained or lost total nitrogen and phosphates.

The most important questions for discussion in this contribution can be formulated as follow. How we can evaluate economical and social benefits of retention of nutrients in wetlands in context of maintaining or improving water quality of recipients as lakes and rivers? What are economical and social short- and long-term losses in relation to water quality in case when wetland would be drained? How we can introduce environmental and socio-economical benefits of the retention effect in wetlands as sustainable management practice into EU agriculture and water policies?

Bormann F.H.and G.E. Likens 1994 – Pattern and Process in a Forested Ecosystem – Springer-Verlag, New York, 254 pp.,

Gorham E. 1991 – Northern peatlands: Role in the carbon cycle and probable responses to climatic warming – Ecol. Appl. 1, 182 – 195,

Johnston C.A. 1991 – Sediment and nutrient retention by freshwater wetlands: Effects on surface water quality – Critical Reviews in Environmental Control, 21, 491 – 565,

Kruk M. 1990 – The processing of elements by mires in agricultural landscape: mass balances based on sub-surface hydrology – Ekol. pol. 38, 73 – 117,

Kruk M. 1997 – Effect of draining on nitrogen flow through mires in agricultural landscape – Ekol. pol. 45, 441 – 460,

Kruk M. 1999 – Peatlands – barrier or source of phosphorus inflow to lakes? – Acta Hydrobiol., 41 (suppl.), 73 – 81,

Kruk M. 2000 – Biogeochemical functioning of hydrologically modified peatlands and its effect in eutrophication of freshwaters – Pol. J. Ecol., 48, 103 – 161,

Lowrance R., R.A. Leonard, L.E. Asmussen, R.L. and Todd 1995 – Nutrient budgets for agricultural watersheds in the Southeastern Coastal Plain – Ecology, 66, 387 – 296,

Lundin L. and B. Bergquist 1990 – Effects on water chemistry after drainage of a bog for forestry – Hydrobiologia, 196, 167 – 181,

Mitsch W.J. and J.G. Gosselink 1993 – Wetlands – Van Nostrand Reinhold, New York, 722 pp.,

Peterjohn W.T. and D.L. Corell 1984 – Nutrient dynamics in an agricultural watershed: observations on the role of riparian forest – Ecology, 65, 1466 – 1475,

Waring R.H. and S.W. Running 1998 – Forest Ecosystems. Analysis at Multiple Scales – Academic Press, San Diego, 370 pp.

CONTROLLED RUN-OFF FROM AGRICULTURALLY USED PEATLANDS IN THE NOTEC RIVER VALLEY AS A METHOD FOR THEIR PRESERVATION

Leszek LABEDZKI[1]

Present status of peatlands in the Notec river valley

The upper Notec river catchment occupies an area of 4098 km^2 (Fig. 1). It is located in the physico-geographical region called the Wielkopolskie Lakeland, in which the number of peat deposits ranges from 10 to 25 on the area of 100 km^2. Index of relative peatland occurrence in the province, where the analysed region is placed, is about 6%. The Notec river catchment is a level, in about 30-60% wooded agricultural land. Wetland area is relatively numerous. The area of the upper Notec river valley is equal to 21000 ha. Peatlands cover an area of 8950 ha (42%). The region is highly differentiated in terms of natural conditions, with a corresponding diversity of its peatlands and non-peat wetlands. The heterogeneity is further increased by the anthropogenic factor – ecosystems range from natural to highly transformed by human economy.

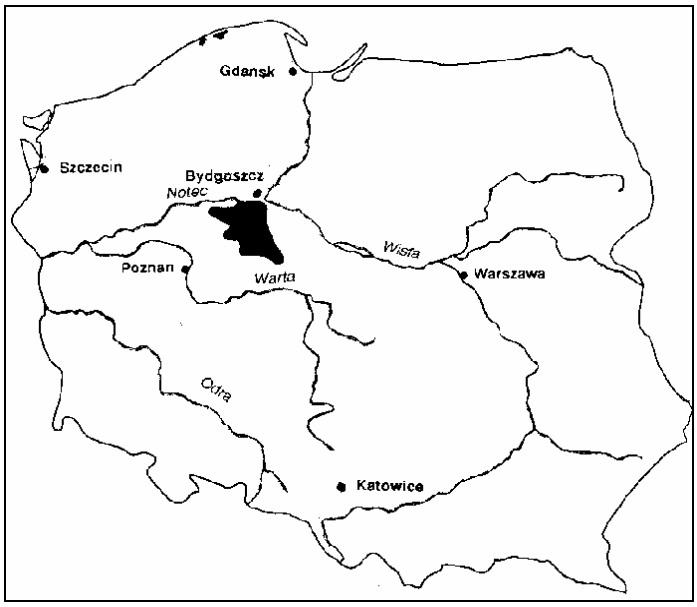


Fig. 1. Location of the upper Notec river catchment

In the catchment there are peatlands of different size, including fens and transitional bogs of hydrogenic soils under grassland and woodland. Peatlands are most typically composed of reed swamp or tall sedge fen peat. The most common type are fens with reed swamp vegetation.

Peatlands in the Notec river valley vary in their degree of transformation by man. Fully natural ecosystems may be encountered alongside seriously degraded ecological systems. Non-degraded ecosystems occur practically only close to a river course. The transformed natural grassland ecosystems in peatlands are located in areas used agriculturally. Grassland have been transformed by economy to a different extent. Many areas have been drained as a result of land reclamation for many years (since the middle of the 19th century). The agricultural use of wetland areas led to their transformation into extensively managed wet and moist grassland and the more intensively managed slightly moist and dry grassland. Apart from extensively managed meadow and pasture-land much of the grassland area is used intensively, including full cultivation. A part of the peatlands have been cut over or continue to be exploited for peat. Some peatlands are completely degraded and have been turned into arable land. It caused in great degree the degradation of peatlands and their natural

[1] Institute for Land Reclamation and Grassland Farming, Poland

resources comprising mainly degradation of organic matter of soil, natural plant communities and whole natural ecosystems. Some peatland sites have been indicated as being high in nature value.

Gravitational irrigations on permanent grasslands, being developed or improved on reclaimed (dewatered) organic peat soils, have the longest tradition in the upper Notec river valley. At present sub-irrigation systems are installed on the area of about 4200 ha, but only 20-50% are in use every year. Introduction and performing of gravitational irrigation on these lands has been caused by the need of restoring water-humidity equilibrium of earlier dried post-swampy areas which were threatened with a serious natural degradation (oxidation of organic mass and its decomposition) as well as by the economic one (decrease and high variability in yielding in the particular growing seasons as well as in the particular years due to irregular distribution of precipitation and its frequent deficits). The techniques with controlled drainage (controlled run-off) and with a constant water level are commonly used for maintaining groundwater level in the drainage-subirrigation systems.

Main threats to peatlands in the Notec river valley

The river valley peatlands apart from natural values are important for economy. For many years they have been a source of fodder (meadows and pastures). To intensify agriculture in the region, systems of drainage and irrigation-drainage ditches were set up. These projects led to the lowering of the groundwater table, making favourable conditions for agriculture, but at the same time resulting in unfavourable changes in peatland ecosystems, in degradation of peat soils, in mineralization of organic matter, in declining biodiversity. One of the main dangers for peatland sites being used agriculturally is overdrying of the soil. Apart from this anthropogenic reason of overdrying of peat soils, frequent atmospheric, hydrologic and soil droughts in the region have their share in the degradation of peatlands.

The effects of subirrigation of permanent grassland in peatlands with the subirrigation systems for maintaining required soil moisture are associated with the quality of operation and maintenance (exploitation) of these systems. Where exploitation of facilities is proper and water uptake is provided, one may avoid the negative effects of droughts and even obtain higher productivity. Subirrigated systems are largely degraded and used only to a small extent if at all. It can be estimated that about 20% of irrigation network and facilities are degraded and decapitalized. From the remaining 80% only about 20% of existing and competent subirrigation systems are in use every year.

Economic situation in agriculture and lack of funds by farmers, farmer associations and local government units responsible for amelioration in the catchment, are the main reasons for the cessation of irrigation system maintaining and conservation as well as controlled water management. Decreased interest in utilization of water facilities is observed. A large area of grassland are abandoned due to less interest in fodder production and its market prices. Additionally land ownership and land structure (small farms, conflicts of interest in exploitation of water systems involving the area of several farms) are unfavorable as regard to proper water management in the river valley.

Actions and methods for counteracting drying organic soils and protection of peatlands in the river valley

The adverse processes mentioned above should be counteracted through active protection of the natural and anthropogenically changed environment. This includes protection of surviving peatlands which have not been used for agriculture, peatlands extensively agriculturally-used as well as those transformed to a large extent due to intensive use and existing drainage-irrigation systems. It is worth to consider the need and the possibility of restoring grassland sites which have been abandoned in recent years.

Studies and implemenation work have been directed at protection of peatland resources paying special focus on countering their further degradation. Protection of peatlands and organic soils in the Notec river valley calls for different measures appropriate for amelioration of the environmental impact of agriculture and drainage-irrigation operation. Among them the most important are: water management principles and actions aiming at conserving existing nature peatlands or restoring lost; improving of operation and development of proper exploitation processes of drainage-irrigation

systems; development and usage of the technology of groundwater irrigation using regulated (controlled) run-off.

In order to be used more effectively, it is necessary to reconstruct and modernize these systems. To achieve a high efficiency of these systems, systematic conservation of the network of ditches and facilities is necessary. A lack of modernization and improper exploitation of the systems and facilities restrict competent water management and result in overdrying grasslands and peatland sites. The proper use of the systems and facilities allows effective water management in the river valley and greater stability in grassland ecosystems.

Method of controlled run-off from drained peatlands and its effect on water status of peatlands

Protection of the peatlands in the river valley aiming at breaking their further degradation and making possible extensive agricultural use for fodder at the same time depends to a large extent on maintaining appropriate soil moisture of peat soils and suitable water levels in the river and its tributaries as well as in canals and ditches. Proper water management in the river valley together with possible renaturalization of peatland sites is a key requirement to protect natural values of the valley ecosystems.

The evaluation of the effects of different technical water management measures on both nature and agriculture should be done to plan and perform any actions in order to improve the status of these peatland sites.

Controlled run-off as a method of counteracting of drying organic soils in a river valley is recommended for farmers as a cheap and simple measure in the Notec river valley. This technique assumes drainage during spring to a groundwater level which assures a minimum air content in the root zone (6%), then the control structures are closed and the position of the groundwater level is determined by the actual precipitation and evapotranspiration. The advantage of this technique is the low cost because only one control structure in the ditch or small river needs to be constructed. This kind of water management control is easy to perform by farmers in the field.

Field investigations carried out in 2002 in some peatland sites showed the positive effect of controlled run-off and groundwater lowering in spring on forming soil moisture and groundwater table depths in the valley meadow sites. The results show that controlling groundwater table depth in the meadow sites with organic soils in the river valley with the method of controlled run-off ensures soil moisture in the range required for peatland protection as well as reduces frequency and duration of soil drought and delays the term of drought appearance.

Socio-economic aspects in the management of peatlands in the region

As it was stated above, economic situation in agriculture and lack of funds by farmers are among others the reasons for the negligence of the proper use of the reclamation systems and facilities, grassland utilization on peatlands and decreased interest in active protection of peatlands. Land ownership and land structure are unfavorable causing some problems of proper water management in the river valley.

Different actions undertaken for peatland protection are exceedingly difficult since almost the most part of the peatlands in the river valley is in private hands and acceptance and participation of the owners in various projects – elements of active protection – is indispensable. As far as now the public awareness of the necessity of peatland preservation is rather poor. In the situation when farmers have serious problems with profitable agricultural production, they are interested in performing any actions directing protection of natural resources in their lands in a small extend. It will be hard to encourage farmers to active protection of peatlands without financial help coming from government budget, self-government budget, ecological funds and EU budget. Agro-environmental schemes and compensations will give some chance and will have some importance in peatlands conservation in the Notec river valley.

Conclusions

In respect of the increase of the sub-soil irrigation areas on valley grasslands, it is generally assumed to increase considerably the irrigated territories, mainly due to the natural reasons for protection of hydrogenic sites. The modernization, rehabilitation, proper operation and maintanance of the existing subirrigation systems are a requisite of the fulfillment of the tasks concerning required moisture conditions for peatland protection. The other tasks of local agricultural and ecological – nature protection - services are to improve social awareness of the need of sustainable usage of peatland grasslands as well as to help farmers in gaining financial resources for performing measures and carrying out proper peatland management for their preservation.

DELIBERATION AS A STRATEGY IN CONSERVATION AND DECESION-MAKING

Jac. A.A. Swart[1], H.J. van der Windt[2] & J. Keulartz[2]

Introduction

Generally speaking, we may distinguish three policy strategies in conservation. We can apply financial instruments, we can apply legislation and we can communicate. To say it more popularly: you can buy it, you can regulate it, or you can deliberate it. The latter approach focuses much more on voluntary measurers that can be taken by people themself. These three approaches are of course not independent. Deliberation often requires good legislation and legislation is often not possible without financially compensating people that are affected by the intended measures.

In this paper we will concentrate upon deliberation which is considered as public consideration about how problems are to be defined and understood, what the range of possible solutions might be, and who should have the responsibility for solving them'[3].

Gaming experiments on public deliberation

Public deliberation may focus on any public topic: immigration, educational policy, and in this case, conservation policy, especially on restoration projects in which arable land is turned into new nature reserves. Because such projects may strongly intervene in the life of people living there, they may meet resistance, especially when the plan is characterized by a so-called governmental top-down approach where legislation is the primary tool as happened in a number of cases in the Netherlands[4]. Because of such resistance we performed a number of gaming experiments in which a top-down versus participatory approaches were applied. In these games the artificial government planned to realize 1500 ha 'new nature' and for the greater part so-called 'almost natural nature' which is in this case wetland nature.

The design of the game was based on a real restoration project in the Netherlands. In the game we find typical stakeholders such as farmers, villagers, conservationists, local entrepreneurs, and officials. The region suffers from a bad socio-economic situation: no work for younger people and unprofitable farms. An important condition in the games was that agreement among all groups on the intended restoration project (within certain conditions of the government) would lead to commitment of and financial compensation by the local Provincial authority.

We performed 5 games, each with 16 – 25 participants, mostly biology or nature management students; each game lasted one or nearly one and a half day[5]. Two so-called steering conditions were applied: two games were characterized by a hierarchic operating government and three games by more bottom-up or participation attitude of the government. In the hierarchic games, the government emphasized its ambitions by stressing ecological arguments. In the bottom-up games the governmental ambitions were maintained but put in milder terms. In addition there was much more willingness to solve simultaneously socio-economic problems in the region.

Both hierarchic games resulted in an impasse of decision-making thanks to contrasting interests, unwillingness to co-operate, and ego. The three participatory games resulted in agreement among the participants on the planning of new nature. However in two of these three games the results, expressed in type and size of the planned new nature reserve were much lower than the government aimed for.

---

[1] Science & Society Section, Department of Biology, Groningen University, P.O. Box 14, 9750 AA Haren, the Netherlands.
[2] Department of Applied Philosophy, Wageningen University and Research Centre, Hollandseweg 1, 6706 KN Wageningen, the Netherlands.
[3] Roberts N. (1997) 'Public Deliberation: An Alternative Approach to Crafting Policy and Setting Direction'. *Public Administration Review* 57 (2): 124-132
[4] Keulartz, J., S. Swart & H. van der Windt (2000). 'Natuurbeelden en natuurbeleid'. Rapport 00/1 NWO programma Ethiek & Beleid, Den Haag.
[5] The games were performed with volunteers from the Wageningen University or were performed as an element of the undergraduate course Nature and Environmental Policy of the Groningen University.

Visions on nature

These results may be considered as a result of interests of the actors. However, as many studies on science and technology have indicated, interests do not explain everything because people do not only behave according to their interest but also along the lines of culture, values, and beliefs[6]. Certainly, the concept of natures belongs to the realm of culture. As Nash stated in 1982: 'Until there were domesticated animals it was impossible to distinguish them from wild ones. Until there were fenced fields and walled cities "wilderness" had no meaning'[7].

If we accept this idea we may expect that nature is conceptualized in relation to the intensity of human intervention and accompanying values. Generally, valuation is related to three classical, philosophical questions: what is true, what is right, and what is beautiful? Corresponding modern questions are: what do we know, what do we value ethically, and what aesthetically? So, we may expect scientific, ethical and aesthetic dimensions in the valuation of nature. Based on literature we distinguish three dominant valuating visions on nature:

- the wilderness vision: preferring original, pristine nature
- the arcadian (or pastoral) vision: preferring semi- natural nature
- the functional vision: preferring usable nature

We already published on this[8], so I will only outline these visions shortly. The wilderness vision is characterized by stressing natural processes as fundamentally, eco-centric ethics, and appreciation of pure wilderness, especially pristine nature. Man should play a very limited role in such a landscape. No intervention is the norm. The most important reference is the landscape before human settlement.

According to the arcadian vision, man and nature can harmonize and that may even enrich nature. Community ecology, especially plant sociology, are often dominant. Nature is especially appreciated because of its cultural historic meaning. Because of this latter aspect we will often find human made objects – such as cottages – as part this landscape. Stewardship is the central ethical position and moderate intervention is allowed. Historic cultural references, especially 19th and 18th century landscapes are important.

According to the functional vision nature is subordinated to man. Its ethics is anthropocentric, meaning that the value of nature is derived from its contribution to human needs or welfare. We see often a focus on special species. It often appears to be good looking species. There is no special reference since current societal features are setting the desired course.

Relevance for decision-making

Do these ideal typical visions really exist, you might ask. Our first answer is that this is an ideal typical classification, a construct that guides us in grasping complex reality as the social cultural reality really is. Nevertheless, we can research to test the power of such constructs as grips for these phenomena.

To do so, we constructed a survey with 10 multiple choice questions. The pre-fabricated answers represented positions of the different dimension of the different visions. All game participants filled in this survey prior to the game in which they participated. It appeared that the wilderness vision is dominant, but closely followed by the arcadian vision. In each subgroups the occurrence of these two visions do not differ significantly. However the functional vision is significantly less present in all groups.

We also applied the survey to a limited number of professionals i.e. conservationists, officials and farmers involved in ecological restoration in the Netherlands. Both conservationists and the officials demonstrate a similar distribution as the students of the games. However farmers displayed a reversed distribution. In all cases we may consider the arcadian vision has an intermediate position.

---

[6] Schwartz, M. & M. Thompson (1990) *Divided we stand. Redefining Politics, Technology and Social Choice.* New York: Harvester Wheatheaf.

[7] Nash, R.F. (1982) *Wilderness and the American Mind*, New Haven: Yale University Press, New Haven. pp. VII

[8] Swart, J.A.A., H.J. van der Windt & J. Keulartz (2001) 'Valuation of nature in conservation and restoration'. *Restoration Ecology*, 9 (2): 230 - 238.

We may conclude that the set of ideal typical visions can be used as an instrument to distinguish visions on nature. However, it appears that in all group all positions can be found. Does this mean that in each group we can find individuals that vary with respect to their nature orientation or does it mean that all vision can be found to a certain extent in every individual? This is important question since in the latter case we may expect a much higher potential for consensus making through deliberation in practice. To find out we analyzed our data with a triangular representation model for each individual[9]. It appears that most students display two or even three visions simultaneously.

The survey was also applied to professionals and a more dispersed distribution was found. If we distinguish between the back grounds of these people than see that conservationist are stronger inclined to the 'wild side', whereas farmers can be found closer to the functional side. Officials are more in between but clearly tend to the wild side. Nevertheless, we see that most individuals have two or three underlying visions. However the number of data point for each is professional group is limited so we should rather consider this as an indication.

We hypothise that often several underlying vision may exist within one individual and that actual expression of such an vision depends on social circumstances. In addition, we may expect that in conservation projects with a centralized distributions of visions among the involved actors a common ground for successful deliberation is present, whereas a more radial distribution may prevent such a route.

Acknowledgement. We thank all the students who participated in the gaming experiences. This paper is based on research that was funded by the research program 'Ethics and Policy' of the Netherlands Organization for Scientific Research (NWO).

[9] A similar approach was applied by J.P. Grime for the analysis of the relative importance of competition, stress, and disturbance on the vegetation patterns: Nature 250, July 5,1974.

Management of the Wadden Sea: does (inter)national legislation bring us further?

Henny van der Windt & S. Jaak Swart

Some of you may have heard of the way many decisions are made in the Netherlands. Most people in this country think that to survive socially in a modern society all important stakeholders have to look for consensus and for that reason have to interact and discuss permanently and in a structural way. For socio-economic issues this model has a long history in the Netherlands. Consequently strikes hardly occur and government does not intervene in social-economic affairs by legislation. Recently the model it has been adopted for other themes such as nature conservation and water management.

I will discuss here if this model can be seen as the deliberative model as described in the presentation of Swart et al (this workshop), if it can be applied to the Wadden Sea and if it can survive when European policy comes in.

1. Introduction

To be able to answer our main questions, we first have to look at the controversial issues in the Wadden Sea area.

The Wadden Sea is a shallow sea of about 15, 000 km2 along the coasts of the Netherlands, Germany and Denmark. It is seen as a highly dynamic ecosystem with tidal channels, mudflats, salt marshes, beaches, dunes, islands, and river mounths. Because of the amounts of tidal flats, the Wadden Sea is seen as a unique area, even worldwide. The area offers a huge supply of food to migratory birds, in all seasons of the year. For these reasons nature conservationists asked for protection in the 1960s. Besides, the villages on the islands and the mainland have a high cultural historical value, which is also considered as an important reason to protect. But the Wadden Sea area also has economic and social values. We find several harbors, villages, industrial areas and military terrains. Recreation and fishery are the most important economic activities, but locally also agriculture, industrial activities and energy exploitation have some importance.

So, different interests exist, and also different views on the future of the Wadden Sea area. Some stakeholders, for instance the action group ‘the wild cockles’, wish to ban at least all fishery activities and to make a real wilderness of the region. Others like to conserve the area in the present situation, while still others accept economic activities. How can governments deal with this variety of interests?

2. Styles of decision-making

In general, three styles of decision-making can be distinguished, when governments try to influence and change the behaviour of citizens and social actors. In the presentation of Swart et al (this workshop) they were mentioned briefly.

The first style, the traditional one, is largely based on the premise that the national government is the central and most powerful actor, which has to convince and force the citizens. For that reason, it is often called a top-down approach. Here legal means are used most, including procedures, laws and regulations to forbid certain activities. The second style focusses on negotiations with main societal actors. This style often goes along with the use of financial means, such as subsidies to stimulate environmentally friendly industrial production or organic farming. The third style stresses the need for inclusion of all relevant actors, two-way communication and deliberations by means of discussion meetings, brochures, information centers and so on.

The last 10 years it has been seen as a necessity to give more room to both the negotiation style and communication/deliberation style, for practical and ideological reasons. Government recognises the importance of a more interactive way of decision-making.

These two styles have in common that power is more decentralized, experts are less important than in top-down policy, aims and objectives are not just imputs but can be outputs of the process, procedures can vary and the satisfaction of the actors involved is a main objective.

However, the two models also differ in some ways. In the negotiation model, the aim is to reach an agreement among the main stakeholders, which can be reached by the exchange of money and goods.

In the communication-deliberation model, all citizens and social groups have to be involved and the main goal is to reach consensus after a process of deliberation.

3. The Dutch situation

Let us first look at the Dutch situation. From the very beginning, Dutch government has accepted the inclusion of relevant actors in the Wadden Sea area for decision-making and management.

This resulted in probably the most complicated decision-making system of all European nature reserves. No only communities, provinces, national governments, state offices, and stakeholders such as fishermen, energy companies, recreation organizations, environmentalists and so on are involved, but decision-making has also to be brought in line with that of Germany, Danmark and four German states. In a complex structure all different governmental layers and stakeholders are included to coordinate the management of the area.

In 1972 a special Wadden Sea plan was adopted, with an overview of the objectives, a management plan and a decision-making procedure, embedded in physical planning legislation. The main objective is ' the protection of the Wadden Sea in the present or a more natural state' but it is added that in case of important social interests it can be decided to accept certain human activities, even if they damage the natural quality of the Wadden Sea. For every important theme it has to be decided how to combine these aims. Clearly this twofold goal is a political compromise between different stakeholders and different governmental organizations. Together with the first Wadden Sea plan it was decided to found five councils, mostly for the coordination of the 30 odd governmental organizations involved. In one of these councils, the most important stakeholders participate, such as employers, fishermen, environmentalists and independent people with various expertise. The responsible ministers have to ask agreement to these councils on important measures regarding the Wadden Sea. Periodically the Wadden Sea plan has to be renewed and then citizens and stakeholders are invited to make suggestions for changes and improvements.

So, in these councils a permanent discussion is going on, about the management and policy concerning the Wadden Sea.

It seems that communication and deliberation play an important role on the regional and national levels. Citizens, but especially stake holders are included. It is difficult to miss any stakeholder or viewpoint. This structure also means that coordination of policy and management is reasonably organized.

A disadvantage of this rather 'heavy' structure it is very time consuming. Furthermore it is questionable whether this procedure is adequate for important controversial issues.

Let us look for that reason at fishery and exploitation of gas. Environmentalists ask to stop fishery for cockles and reduce blue mussel fishery and to forbid gas and oil exploitation. Fishermen and oil- and gas companies say that they can work without serious harm to the ecosystem. Furthermore, they say, they have historical rights and sometimes even legal concessions to exploit.

About both issues, a national debate took place, not only in the Wadden Sea councils, but also in Dutch newspapers and parliament. Last year, is was more or less accepted that the gas and oil will be exploited after 10 years or later and in such a way that harm to the Wadden Sea will be unlikely. With respect to fishery, a complicated systems has been developed, with working groups, including experts from different sides, a zoning plan and a system of quota per year, dependent on the production and natural conditions. This system started 5 years ago as an experiment. Although not full consensus was reached, all arguments were discussed and it can be concluded that the controversy is under control. Also on the national level, communication and deliberation were very important. It is often proposed to compensate oil companies and fishermen, but till now this has not happened.

So, the Dutch Wadden Sea is protected by a complex system of regulations and councils, all stakeholders are represented here and they respect each other. The government aims to improve the process of looking for consensus, not only about measures, but also about underlying visions. It is tried to formulate a common objective and aim for the Wadden Sea, and all stakeholders are invited to discuss it. The lack of a common frame, a common reference, a common value system or a common set of objectives is seen as a serious problem in overcoming different viewpoints.

It is curious that scientific information play a minor role: the compromises are hardly founded on scientific evidence. It is seen as unlikely by most scientists that oil exploitation is a problem for the

natural quality of the Wadden Sea. Still parliament has forbidden the exploitation. Many scientists fear that fishery, especially for cockles, but probably also for blue mussels influence the quality of the Wadden Sea seriously. Still parliament hesitates to forbid fishery.

4. International efforts

Let us look at the international situation.

During the last 15 years, the Wadden Sea area has become more and more a matter of international responsibility. Is it possible to communicate and deliberate in the same way as at the regional and national level?

The three Wadden countries work together and tried to formulate common aims and a common management plan. Here again all kinds of governmental layers are involved. Recently they also founded a so-called Wadden Sea Forum to discuss several viewpoints and if possible to reach consensus on the main aims and objectives. In this forum all main stakeholders participate, such as organisations of farmers, of fishermen, and of conservationists together with local authorities to overcome the problem that the commitments of the several stakeholders (and local governments) are weaker than at the national or regional level. Besides, it is much more difficult to reach consensus. Even the aims of authorities from the different countries differ, especially at the operational level. As a result, the so-called common aims of the three countries are more vague than the national ones.

So, on this level communication and deliberation take place to some extent, but it can be doubted if this can be successful.

The most recent development is that EU became a important player. EU asked their members to implement the EU directives, especially the Habitat and Bird directives. It is obvious that implementation of these directives has hardly anything to do with communication and deliberation, and not even with negotiations.

As a result of the directives, the designation of nature reserves, including the Wadden Sea is obliged, and can be enforced by financial means and by European court. It this sense, the protection can be improved, dependent of the situation in the countries involved.

However, three problems occur.

First, the directive is a compromise in itself, all important habitats have to be protected, it says, but if important socio-economic issues or historical rights are at stake, activities can be accepted in certain circumstances, if these do not cause serious damage. The terms ‘important socio-economic issues’ and ‘serious damage’ are hard to interpret.

Second, national states try to convince EU authorities that their national laws already can be seen as an implementation of EU-directives. And they are clever in doing that. The Dutch Court has decided that it is no able to interpret the directives adequately and has asked the European Court for clarification.

Third, if national states try to adopt and implement EU legislation, processes of consensus building between stakeholders can be disturbed.

To overcome different viewpoints, stakeholders might ask the several courts to intervene instead of deliberate and discuss with each other. Consensus building will be more difficult.

5. Concluding remarks

So we can conclude that the deliberative model as is described in the presentation of Swart et al (this workshop) can be applied to the Dutch Wadden Sea. A permanent decision-making structure exist, all parties can deliberate, participate and influence policy and management. Serious deliberations take place about aims, goals, and measures. Certainly, it is not the ‘pure’ liberation-communication model, because stake holders play the main role, and legislation is an important addition to the decision-making structure.

On the international level it is much less room for communication and deliberation. In the context of trilateral cooperation, it is tried seriously, but it can be doubted how successful this will be. Will deliberations take place, will stakeholders and citizens be able to influence policy? On the EU-level, it is hardly tried to deliberate: here the top-down approach is dominant. It can be questioned if this will be successful. The process of consensus building on regional and national level can be frustrated.

6. Literature

Fels, P, 2001. Implementation of the EU Habitat Directive for monitoring and reporting, Wadden Sea Newletter, 3, 24-25.

Goedhart, A.F., 1998, Vogel- en habitatrichtlijn, de juridische meerwaarde in Nederland, DLN, 99 (6), 208-211.

Jong, J. de, D. van Heijningen, K. Laansma, P. Kleine Punte, A.Boon, (2002), Referentiekader Waddenzee, RIKZ, Haren.

Turnhout, E, 2003, Ecological indicators in Dutch nature conservation, Aksant, Amsterdam.

Windt, H.J. et al, 1988, internatioanel aspecten van het beheer en beleid van de Waddenzee, RUG., Groningen.

Wolff, W.J. et al , 2003, Challenges to the Wadden Sea, Min LNV/RUG, Groningen.

MAKING BIODIVERSITY ACCESSIBLE FOR ENGINEERS AND BUREAUCRATS

Dr A. Feest[1]

Key words: biodiversity quality, quantitative indices, species richness, species value

Introduction:

I teach ecology to engineers and I have to recognise that the intellectual training of an engineer in no way equips them for some elements of ecology. Particularly difficult is taxonomy; once six English names of plants/animals have been given the students are on intellectual overload. Using Latin names produces overload earlier. The identity of species is very important in ecology as without an identity there is difficulty in predicting an organism's activity and response to change. Teaching ecology without using the names of example organisms is extremely difficult but possible. Some of the ethical and qualitative elements of ecology are also difficult although given time the students do enjoy this fresh territory.

These difficulties led me to consider the problems of engineers and bureaucrats (who often come from an arts or social sciences background that no more equips them to deal with ecology than an engineering background) in interfacing with ecologists given this intellectual mismatch. These problems have become more important as ecological issues have moved up the socio-political agenda. Perhaps the most important example of this has been the need to deal with ecological issues in Environmental Impact Assessments (EIAs). As a generalisation one can be sure that ecology is done badly in EIAs due to the lack of time or appropriate seasons for surveying and also the complexities of prediction of response to change. As a rule I start with the ecology when considering the quality of an EIA!

The difficulties of an engineer or bureaucrat are illustrated by the chart in table.1 of the surveying of spiders on a site for about 18 months. What do they make of this? Not much I suspect. Most biodiversity information consists of a list of species found at a site over a period of years. In the UK this list may hae been compiled over more than a hundred years! What are an engineer or bureaucrat to make of one of these lists?

This situation is made more complex by the consideration of biodiversity. There is disagreement over the precise definition of what comprises biodiversity although there is general agreement over what is intuitively considered to be biodiversity. This matters, as limited funding requires engineers and bureaucrats to make decisions on where and how various competing habitats are affected by decisions.

The problems of estimating biodiversity were brought home to me when a paper was published detailing the list of species of macrofungi found in a Scottish woodland. The site had been studied annually for 25 years and new species for the site were being recorded at the same rate at the end of 25 years as when the study started. So what did the list represent? I would suggest it is a historic document of what has occurred at the site and that it has some predictive quality of what might occur in the future but the probability of this prediction can be quite low.

I have therefore devised a methodology that allows these issues to be expressed as indices and the compilation of a set of quantitative indices allows the quality of the biodiversity of a site to be judged. This has required me to create a sampling process that allows for the measurement of numerical biodiversity indices that can be used to assess the biodiversity quality of a site for a taxonomic group.

[1] Engineering and Environmental Management Group, Faculty of Engineering, University of Bristol, Bristol BS8 1US

Materials and Methods:

The principle is that twenty to 35 sample sites (depending on taxonomic group) are identified at regular distance along a straight line through the site (for randomly ordered habitats; ordered habitats e.g. tree plantations need random distances between sample plots) see fig.1. For macrofungi, each sample site is represented by counting all of the fruit bodies occurring in a 4 m radius circle (= c. $50m^2$), and twenty of these sites are surveyed giving a total surface area of 1000 m2. For most UK habitats the distance between sample sites can be 20m but for very large sites this distance can be increased.

The data collected can be used to calculate the following indices:

Species richness; the number of species found in a unit area (defined for each taxonomic group).
Biodiversity index; these are numerical indices that are said to represent the probability that the next species encountered will be different from the last one. Commonly used indices are the Shannon-Wiener, Simpson's and Berger-Parker indices.
Density; the number of individuals per unit area.
Species value index; where species are valued more highly according to their perceived rarity. A mean value of all the species encountered gives an approximation of the relative rarity of the species encountered in the sample.
Biomass; for some groups e.g. macrofungi the biomass of the total of the individuals recorded can be calculated. This is important since all living organisms relate to, and are often, the habitat of other organisms so the more there is of them the more resource there is available to other taxonomic *groups.

This process can be made very much quicker by computerising the analysis of the results and this has been now been done.

Results:
Figs. 2 and 3 give two examples of the computer programme output for macrofungi. The Weston Big Wood site has a lower species richness but a higher species value than the East End site. In all other indices East End Wood is higher except for biomass (cap area index)) where the sites are similar. We can therefore typify the biodiversity qualities of the two sites as one (East End Wood) being richer in species and biomass and the other (Weston Big Wood) has rarer species. Weston Big Wood may have a lower Species richness but the slope of accrual of new species shows no sign of flattening and therefore it might be suggested that the Species Richness is 45+ rather than 45 by contrast the East End Wood site shows that no new species were observed after plot seventeen and therefore the Species richness of 65 is expected to be fairly accurate.

Discussion:
It depends on the priorities set as to which of the two example sites should prevail in a contest for resources. If rarity is the objective (Species value index) then there is little doubt that Weston Big Wood is the most valuable whereas if number of species present is the objective then East End Wood is superior. By viewing this example it can be seen that the matter of biodiversity quality is complex and relates to the importance put upon the various elements that might be said to make up the quality of biodiversity.

Viewing this whole scenario will put the question of biodiversity and valuing biodiversity on a different footing. Sites may be compared for biodiversity quality for an individual taxonomic group but the problem of valuing the relative importance of different taxonomic groups might then become a problem. Take the following case: A river valley-side has half of the steep slope covered with ancient Oak woodland and the other half with modern coniferous forestry. Given the conventional valuing of

the habitats there is little doubt that the ancient Oak woodland would be more highly valued. A review of the macrofungi shows that the shade and deep litter layer of the coniferous forestry have produced substantially higher biodiversity values for all biodiversity components. It is to be expected that a review of invertebrates will show substantially higher populations of fungus-associated invertebrates with the coniferous forestry. How are these competing interests and values to be rationalized?

I have shown that biodiversity can be made more accessible for engineers and bureaucrats by presenting the data as a series of biodiversity indices so that sites can be compared without them having to know much about the identity of the species concerned. This now gives a picture of the biodiversity quality of sites and these qualities are what need to be compared and prioritised. This is not an easy matter but at least it can be related to the target biodiversity strategy for the areas concerned. This is an improvement over the current situation where these decisions are made on the basis of non-comparable and non-standardized species lists. We may have made the task a little easier and I would suggest that the considerations relating to biodiversity quality are more accessible for engineers and bureaucrats since we have avoided the problem of taxonomic identity and can present a clearer picture of the ethical and moral issues.

Weston Big Wood (Limacella site)
24/09/00

Species name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Sum	SVI	CAI
GPS easting	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
GPS northing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
0: Entoloma hebes	5						1					1	1								8	5	56.549
1: Entoloma nidorosum	1	11																			12	2	1,357.168
2: Agaricus praeclaresqu...	1					1															2	4	353.429
3: Inocybe maculata		3	7		25	1		1											1	3	41	4	1,577.865
4: Mycena galopus		2		3		3														3	11	2	34.558
5: Melanophyllum eyrei		1																			1	10	3.142
6: Cystolepiota adulterina		1				1												1			3	5	58.905
7: Inocybe brunneoatra		1																			1	4	28.274
8: Lepiota grangei		1															1				2	5	14.137
9: Cystolepiota seminuda		2	3				2									2				6	15	3	11.781
10: Hypholoma fasciculare			47		94				22												163	2	4,608.716
11: Calvatia excipuliformis			1																		1	2	78.54
12: Cortinarius olivaceof...				1																	1	5	12.566
13: Hydropus floccipes				58																	58	10	182.212
14: Mycena pura					3	6			2	6				39	1	1			3		61	2	766.549
15: Lepiota castanea						1	1										1				3	5	37.699
16: Lepiota fulvella						1										1		1			3	5	37.699
17: Armillaria mellea							14												3		17	3	3,004.148
18: Sericeomyces serenus							1														1	5	19.635
19: Marasmiellus ramealis							36														36	2	63.617
20: Mycena galericulata							1														1	2	28.274
21: Russula pseudointe...								2													2	4	226.195
22: Cortinarius umbrinol...								4													4	5	28
23: Inocybe piriodora								6													6	4	301.593
24: Limacella glioderma									5	8	1										14	5	395.841
25: Lepiota echinacea									2												2	5	25.132
26: Pluteus griseoluridus										2											2	5	25.133
27: Entoloma icterinum										1											1	5	7.068
28: Lycoperdon pyriforme											23		9						9		41	3	515.221
29: Mycena speirea													1							2	3	3	2.356
30: Scleroderma areolat...														4							4	4	28.274
31: Clitocybe phaleophth...														9							9	4	254.469
32: Limacella ochraceolu...																3	1	1	1		6	20	301.593
33: Limacella vinosorube...																	2				2	20	56.549
34: Collybia ocior																	5				5	4	98.175
35: Entoloma subradiatum																	1				1	5	12.566
36: Lepiota subincarnata																	1				1	4	7.069
37: Coprinus disseminat...																		180			180	2	318.086
38: Clitocybe clavipes																		8			8	2	402.124
39: Inocybe geophylla var...																			1		1	2	12.566
40: Lepiota pseudohelve...																			2		2	5	39.27
41: Lepiota cristata																			1		1	2	12.566
42: Pluteus salicinus																				1	1	4	50.265
43: Lycoperdon perlatum																				2	2	2	56.549
44: Agrocybe erebia																				1	1	4	28.274
Summary	7	22	58	62	122	14	56	13	31	17	24	1	11	52	1	7	12	191	21	18	740	4.667	15,540.399

Species Richness = 45
Shannon-Wiener Index = 2.5732(2.4439)
Simpson Index = 7.5943(6.6396)
Berger-Parker Dominance Index = 0.2432(0.2965)
Fruit Body Density = 0.74 per sq.m.
Species Value Index = 4.6666+/-3.7416
Cap Area Index = 15540.3987

Ethical and socila issues in the implementation of European policy.
Lower Danube Wetland systems - case study.

Prof. Dr. Angheluta Vadineanu
University of Bucharest
Department of Systems Ecology and Sustainable Development

Background

For the analysis we are promoting the broad meaning of the concept of biodiversity, covering:
i.diversity of ecological systems,
ii.species and taxonomic diversity,
iii.genetic diversity within and among species,
iv.human social organization and cultural diversity.
and we are recognizing three categories of ecological systems identified at different space scales:

i. Full self-maintaining ecological systems (natural and seminatural)
ii. Human dominated ecological systems
iii.Human made systems.

The first two categories defines the Natural Capital => foundation for the Socio-Economic Systems.
Based on that we are recognizing in fact that biological and ecological diversity is the biophysical foundation which provides a wide range of natural resources and services as well as the interface with economic systems in the socio-ecological complexes.
Thus, balancing by adaptative management of the dynamics of socio-economic construction with its biophysical foundation (sustainable development) is the only solution for social ethical and ecological issues.

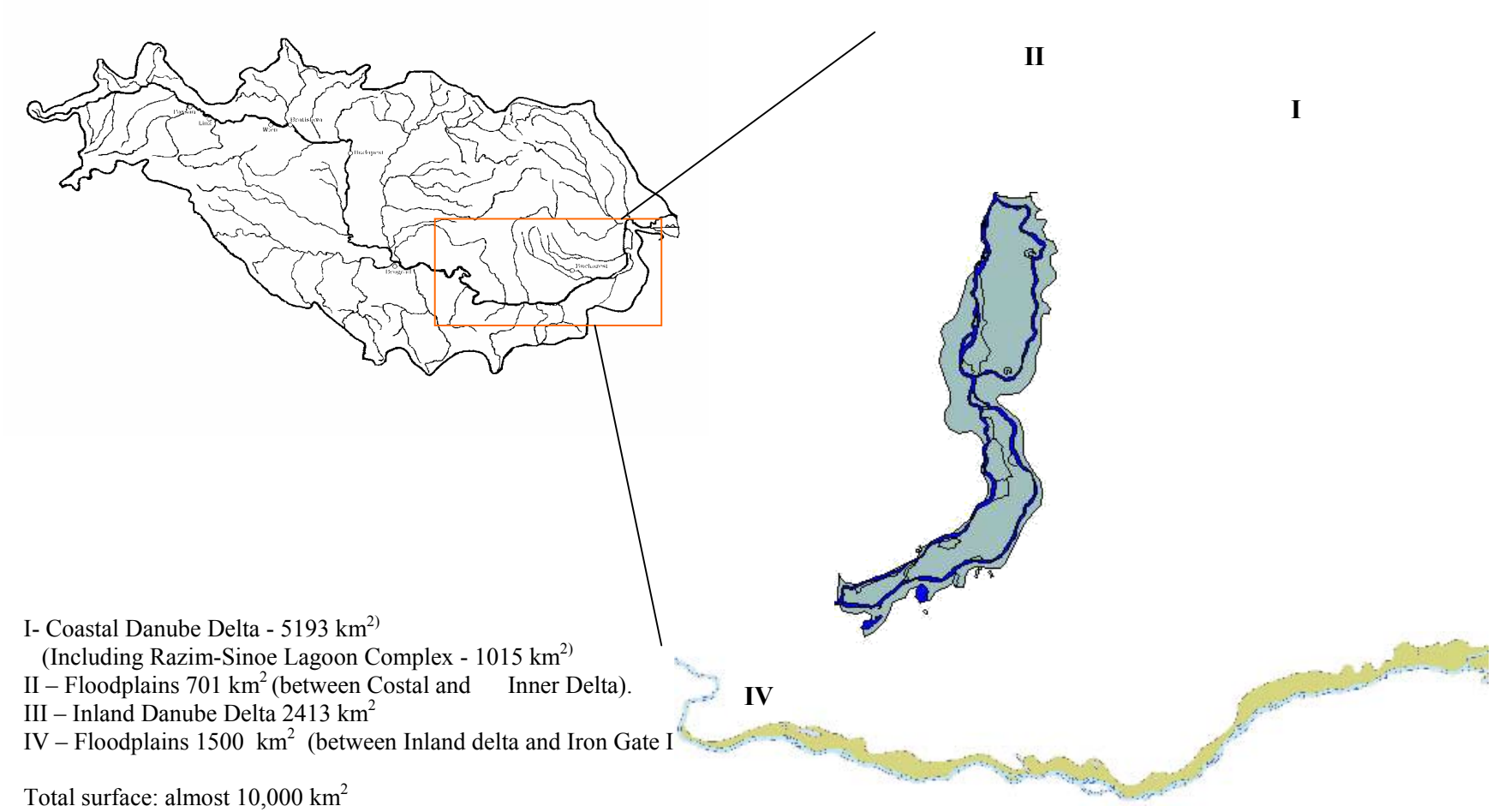
In the last century due to:

- the need for rapid economic growth and
- based on the principles of neoclassical economy and
- a poor understanding and lack of scientific background in assessing the multifunctional role of wetlands,

Most of the wetlands have been treated as **wastelands and a clear policy has been developed for their conversion into intensive productive units (crop farms, tree plantation, intensive fish ponds and human settlements)**

Similar conversion policy have been developed and implemented in the Danube basin affecting also the structure and functioning of the Danube Wetland Systems (LDWS)

Identification of the LDWS - Structure and Spatial Distributions of the main units: Components and surfaces



I- Coastal Danube Delta - 5193 km$^{2)}$
(Including Razim-Sinoe Lagoon Complex - 1015 km$^{2)}$
II – Floodplains 701 km^2 (between Costal and Inner Delta).
III – Inland Danube Delta 2413 km^2
IV – Floodplains 1500 km^2 (between Inland delta and Iron Gate I

Total surface: almost 10,000 km^2

Conceptual frame for the analysis of ethical and social issues

Hierarchical organization of the environment (from local ecosystem to macroregional land and water scapes). 4 spatial scales for analysis
- local (Island of Braila Wetlands- IBrW)
- micro-regional (LDWS);
- regional (LDC) and
- macro-regional (Danube River Catchment and North Western of Black Sea)

Many local and micro-regional problems as well as remote problems (e.g. eutrophication and its impacts) are the effects of large scale(e.g. Danube River Catchment) pollution and **structural changes.**

This rise an important ethical issue for upstream countries and in the same time social issues for downstream countries, affecting important communities and causing important economic negative impact.

The recognition that any plant and animal population or species has a contribution to:

i. Genetic diversity at the species level, provides adaptative potential and support for speciation;
ii. Species richness and their genetic diversity provides adaptative potential and support for adaptative transformations and evolution of the natural and semi-natural ecological systems.
iii. Social, cultural and human genetic diversity provides the adaptative potential for the evolution and development of socio-economic systems).

The recognition that the biophysical units have intrinsic values as well as many use and non-use values.

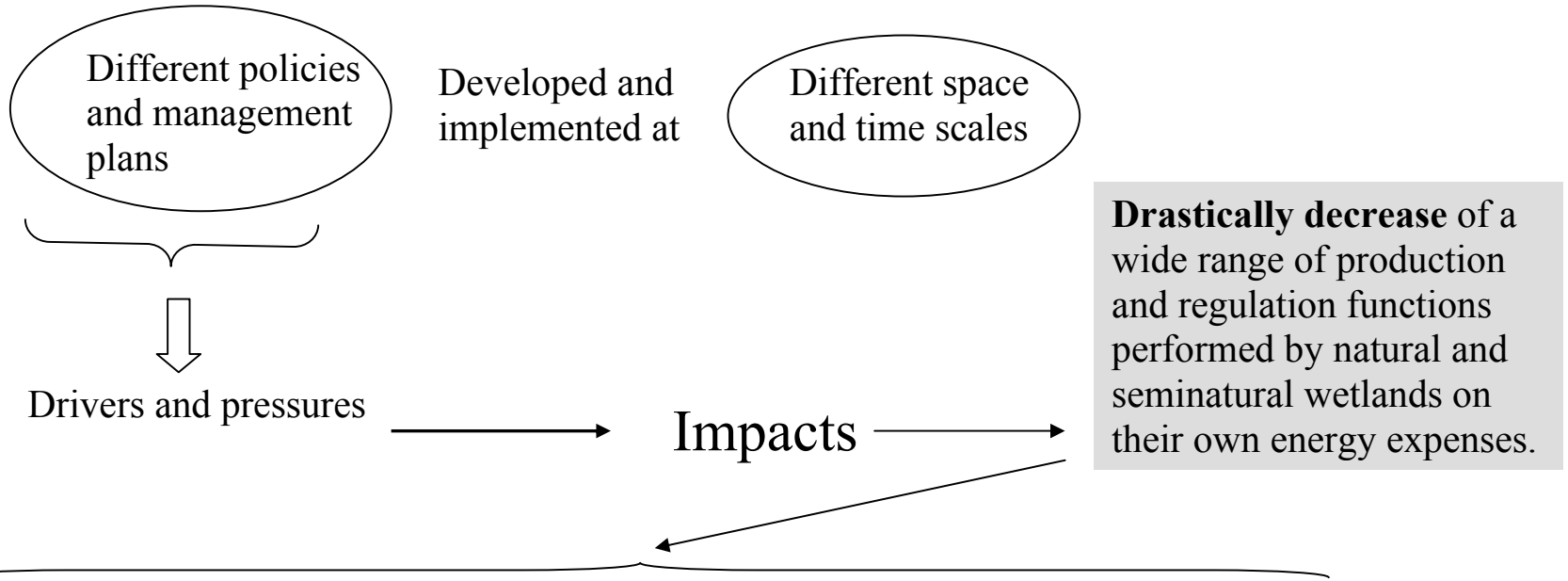
Biological and ecological diversity is the foundation and the source of a wide range of natural resources and services as well as the interface with economic systems in the socio-ecological complexes. The conservation of biological and ecological diversity is a fundamental condition for sustainable development.

Ethical and social issues: -Drivers, pressures and the dynamic of LDWS: assessment of past policies and management plans. Four major successive phases of changes in the objectives and management of the wetlands and their renewable resources have been identified:

- **I) Empirically recognition** by the local communities of the values of wetlands as production and self-maintaining units. Management programmes focused on the maintenance or enhancing, through minor changes in hydrology, wetland's **productivity**.
- **II)** Management plans have been focused on the **increase of productivity** by major human intervention – intensive and semi-intensive fish farms, changes in species composition a.s.o.
- **III)** The **extensive substitution/replacement** of wetlands with other categories of ecosystems – agrosystems, harbors, industrial areas, human settlements. The multifunctional role of wetlands was totally neglected according with the principles promoted by the theory of neoclassical economy.

IV) Rehabilitation and reconstruction of wetlands as self-maintaining and multifunctional units. This phase started very recently and it is expected to be extended in time and space.

Ethical and social effects of the drivers and pressures



Social consequences

-Poverty
-Insecurity (both environmental and food)

Ethical consequences

-The transfer of the cost of environmental degradation to others: both in time and space
-Unbalanced and inequitable access to the diminished resources.

Drivers, pressures and the dynamic of LDWS: assessment of past policies and management

Drivers	Pressures	Space Scale	Impacts
· Land reclamation · Increase of crop production and livestock	· Conversion of wetlands into agro ecosystems · Over exploitation of natural resources · Introduction of alien species	All Scales All scales	1. Erosion of biophysical structure 2. Eutrophication (pollution) 3. Reduction of sediment load and coastal discharges 4. Hydrological changes
Commercial energy production in hydropower plants · Increase waterway transport	Intensification of auxiliary energy and material inputs into food production systems	Regional and river catchment scale	5. Changes in the foodweb structure 6. Changes in the production function 7. Changes in the buffer capacity 8. Changes in the habitat function 9. Erosion of ecological and biological diversity
Urbanization and industrialization	Point and diffuse emission Hydrotechnical works	Mainly at regional and river catchment scales	10. Remote changes (N-W Black Sea) 11. Coastal erosion 12. Eutrophication 13. Foodweb changes 14. Declining production, habitat and information functions

Social and ethical consequences at different space scales

Space scale	Consequences
- Local (Island of Braila Wetlands- IBrW) - Micro-regional (LDWS);	Excluding or marginalizing local population. Different management plans with different short and medium term objectives driven by higher political considerations. Under development of ecoturism based activities.
- Regional (LDC) and - Macro-regional (Danube River Catchment and North Western of Black Sea)	Long term and long distance effects (e.g. effects to next generation; impact on downstream countries). Overexploitation of resources Conversion of habitats/decrease of overall diversity and as a consequence increase insecurity (environmental and food security)

Islands of Braila ecological complex: an attempt for economic valuation

Instead to adapt and develop the socio-economic system according with their natural foundation, policy and decision makers choose
to transform the natural and totally self maintaining foundation into human dominated and controlled one.

The crude estimation of Total Economic Value(TEV) of the remained Wetlands and established polders in the IBr ecological complex, allowed a better assessment of short term and sectorial disadvantages against long term and holistic advantages.

Estimates of economic value of the major functions of IBr Wetland complex (reference state)

Functions		Economic value Millions USD/year	Socio-economic systems to benefit form
Production		41	Local, micro-regional
Regulation	Nutrient retention	152	Local and regional
Regulation	Flood control	13.5	Local and regional
Habitats/Biodiversity		15.3	Local, regional and macro-scale
Information (Ecotourism)		15.2	Local and micro-regional
TEV		237	

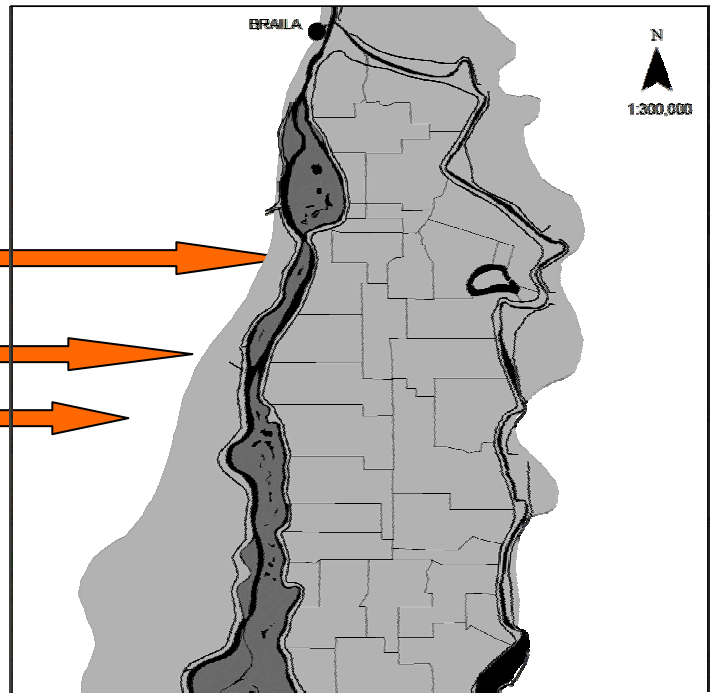
-By the end of 1960 – from the total surface of 1376 square kilometers 1073 was diked.

-The largest one is Big Island of Braila of aprox. 670 km^2.
The cost exceeded 100 mil.USD.

Actual wetland structure:
A – Small Islands of Braila (SIBr) wetland system (210.7 square kilometers)
B – Floodplain between river bank and drikes (narrow strip – 93 square kilometers)
C – Lateral floodplans (polder of 500 square kilometers)

- A large ecological complex of 1376 square kilometers of floodplain
- Three major hydrogeomophic units:

A – Big Island of Braila (670 square kilometers)
B – Small Islands of Braila (SIBr) wetland system (210.7 square kilometers)
C – Lateral floodplans (500 square kilometers)



1
- Aquatic ecosystem network – 619 **km^2**
- **Fishery sector: 3-4 ktones of fish yield**

2
- 275 **km^2 flooded 6-7 months per year**
- **Habitats for spawning, breeding, nesting and feeding for birds and fish sp.**

3
- 482 **km2 flooded 2-3 months per year**
- **Natural alluvial forest (115 km^2)**
- **Extensive and traditional agriculture**