Sustainable Management of Headwater Resources: The Nairobi ‘Headwater’ Declaration (2002) and Beyond

Martin J. Haigh
Vice President for Europe
World Association of Soil and Water Conservation
C/o Department of Geography, Oxford Brookes University
Oxford OX3 0BP, England
mail@gaia25.freeserve.co.uk

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Abstract: Promoting integrated, self-sustainable management strategies for the management of the zero-to-first-order catchments, which provide the marginal areas of every river basin, is the goal of the ‘Headwater Control’ movement. Headwaters provide the source of fresh water resources and changes in their characteristics may affect the water resources in all areas downstream. Because of the fractal nature of all river systems, headwaters may occupy around 50% of the land surface. Since 1989, the study of headwaters has been advanced by the ‘Headwater Control Movement’, later International Association for Headwater Control. After 15 years and five major international conferences, the movement has grown from a European to a global initiative, whose proceedings demonstrate a change in the approach to sustainable watershed management from ‘control’ to ‘accommodation’ and ultimately ‘self-control’ within the limits of the natural environment. The human dimension of headwater management remains its major challenge, especially the reform of the management institutions and the empowerment of local communities for environmental management.

This report examines the characteristics of the ‘Headwater Control’ philosophy in relation to three sister movements: the FAO’s ‘Land and Livelihood’ agenda, ecohydrology, and the ‘Better Land Husbandry’ ideology sponsored by the World Association of Soil and Water Conservation. In September 2002, in response to the Johannesburg World Summit on Sustainable Development, the Headwater Control Movement issued its own manifesto, the ‘Nairobi Headwater Declaration for the International Years of Mountains and Freshwaters’, which was endorsed by five United Nations agencies and published by the United Nations University in Tokyo. Subsequently, the movement has worked towards the implementation of the recommendations of the Declaration, promoting trans-national working groups on sustainable watershed management across the Balkan States and Northern Turkey, sponsoring a NATO-Advanced Research Workshop to tackle the problem of evaluating the environmental roles of wetlands in larger headwater catchments, and initiating contributions towards embedding watershed consciousness within programmes of Education for Sustainable Development.

Introduction: Self-sustainable Headwater Development

Headwater Control is a movement that emerges from the shared concerns of applied environmental scientists, especially field operatives in forestry, soil and water conservation and water resource management, who work in uplands and lands considered marginal by governments. The ‘Headwater Control Movement’ (HCM), however, has an aspect that extends beyond technical environmental problem solving. It also aims to change the way that headwater regions are managed, in particular, to promote an integrated, locally-empowered, synthesis of lands and livelihoods.
Headwaters

A headwater is a zero to first order catchment land where the water flow-lines originate. Headwaters are very major landscape features. One pioneering GIS survey estimates that headwater areas cover 42-58% (1,334,612-1,878,433 km²) of the European Union (Parrachini et al., 2000). The area seems very large but consider—headwaters share the fractal characteristics of all river basins. The Danube has headwaters and so does its smallest tributary. So the area of land that may be counted ‘headwater’ depends to a large measure on the scale of the investigation. Upland watersheds include headwater areas but many equally important headwater systems are found in lowlands. The essential characteristic of a headwater is that it is both a margin and a point of origin. Headwaters provide the recharge zones for both surface and ground waters. At many scales, headwater lands lie close to the margins of hydrological and often also socio-economic systems. Frequently, they are frontiers of development, wracked by conflict concerning the exploitation of natural resources, tourism, nature protection and political control. Adverse conditions can have dramatic effects on the environmental socio-economic and even political stability of areas downstream.

The challenge accepted by the Headwater Control Movement is to promote appropriate self-sustainable management strategies that meet the needs of the headwater habitat, including its human inhabitants, and those of habitats downstream. Works published in the proceedings of the international meetings of the International Association for Headwater Control (Krecek et al., 1989, 1996; Haigh and Krecek, 1991, 2000; Krecek and Haigh, 1992; Singh and Haigh, 1995; Haigh et al., 1998; Janksy, Prasad and Haigh, 2005) include many scientific and technical insights. However, they also demonstrate a sea-change in watershed management thinking, a shift from ‘control’ to ‘self-control within the limits of the natural environment’.

Since 1989, the Headwater Control Movement has devoted itself to developing an integrated approach to the management of headwater regions. Headwater Control contains the belief that, if the headwaters of a region are in good condition, they will transmit fewer problems downstream.

Beyond this, Headwater Control is constructed on three principles.

1. Headwater environments are threatened by environmental changes due to human action. Headwater Control meetings routinely deal with problems caused by forest decline, land degradation, deteriorating water quality, and the damaging effects of air pollution, agriculture, road construction, tourist developments and mining.

2. Direct intervention can secure environmental quality. Headwater Control meetings showcase many examples where pollution control, forestry, soil conservation, bioengineering and/or community action, have improved the vitality of the headwater environment.

3. Solutions demand the practical application of co-ordinated and integrated environmental management. The HCM strives towards the integrated treatment of headwater landscapes—both in their biophysical and social components. The aim remains to find an approach that unites the imperatives of environmental conservation, (self) sustainable development, environmental reconstruction, the empowerment of headwater peoples and the regeneration of livelihoods, through policies and institutions that promote appropriate action.

Neglected thus far, has been the role that could and should be played by environmental education for sustainable development because, over recent meetings, it has become obvious that improved watershed management, like all environmental management, demands a change in social attitudes. This includes a shift away from granting primacy to short-term economic gains and away from belief, in the still current myth, that it is desirable for technology, routinely, to replace the functions of nature (Berry, 1999). It may be hoped that, before the next full meeting, the ‘Sixth International Conference for Headwater Control’ (IHC6) scheduled for Bergen, Norway in June 2005, some progress may be made in this respect.

Meanwhile, over the years, Headwater Control meetings have generated a broad consensus on the problems that face these special and vulnerable lands (Haigh and Krecek, 2000). Their common problems include: soil, forest and water resource degradation and pollution by various external agencies and poor management structures. Effective headwater management continues to require better technologies, better policy frameworks, changes in land husbandry patterns and direct engineering intervention.

Research needs to be reoriented to focus on the internal tolerances, exchanges, checks and balances within headwater landscapes. However, while there is a need for new data, especially from long-term environmental monitoring and also for new models of headwater management, there is a greater need for better access to and utilisation of existing information. Much valuable data is going to waste, simply because it is contained in older publications or locked away in official files. Research results remain scattered, diverse and unrelated.
The tasks of headwater control transcend professional and disciplinary specialisation. They are best tackled holistically by multi-disciplinary teams but the structure of existing management institutions often impedes the development of such teams.

There is a need to create truly self-sustainable management structures, both socio-economic and environmental and to relate local management to the needs of the larger watershed. More attention has to be given to systematic analysis of the downstream impacts of changes in headwater regions and to establish management across the full spectrum of highland-lowland interactions. For example, in China, over-utilisation of the headwater resources in the Tarim Basin causes desertification and large-scale farmland abandonment downstream. Time and again, headwater problems are linked to externally-imposed policies and inappropriately defined institutions, many established for the exploitation of a particular economic resource, often for the benefit of outsiders. Communications between headwater communities and these agencies are often neglected or ineffective.

Institutional constraints are the major obstacle to effective headwater management. New institutions, which are local, flexible and holistic, are needed. Central to this development is the emerging concept of ‘Basin Citizenship’, where citizenship involves both rights and duties, including stewardship for lands managed as a public trust. Effective management requires new institutions that are oriented to integrated environmental stewardship implemented by empowered local communities (Van Haveren, 2000).

Headwater communities require greater self-determination, a more secure economic base, and better land husbandry supported by better-targeted direct intervention to remediate environmental and socio-economic difficulties. However, the empowerment of local communities in headwaters is no panacea. Often, it is the society and economy of the headwater community as much as the physical environment that needs treatment. Its problems include shortages of scientific and technical expertise; land-use conflicts that pit local against wider regional or national priorities, weak local economic systems, alienation and rural depopulation.

The ‘Headwaters ’98’ (IHC4) conference in Meran, Italy agreed that headwater economies tend to be controlled by external values awarded to their resources and products (Haigh et al., 1998). In many cases, this value is determined by the political muscle of their inhabitants—or the lack of it. Water resources, in particular, are prone to be undervalued in treaties with powerful downstream neighbours or otherwise wasted by inefficient usage. For example, in Jammu and Kashmir, 40% (and in South Africa and Iranian Azerbaijan 60%) of the water resource ran to waste. Azerbaijan’s planners believe that 25% could be collected for agriculture. The Lesotho Highlands Water Project may, ultimately, generate 25% of that nation’s foreign exchange earnings. Inhabited headwaters are affected by an array of external and indirect processes, which included: changes in their relationship with the economic system of their host nation, changes in the policies and political balance within their host nation, and changes in their wider economic and geopolitical context—especially where they lie on political frontiers.

**Headwater Control—A Sample from Its Scientific Contribution**

Despite its policy goals, much of the work of HCM meetings concerns the elaboration, qualification and reinforcement of the scientific basis of headwater management. Existing computer management models for environmental forecasting have, generally, been found wanting. Consequently, the emphasis remains on the cataloguing and sharing of empirical findings. Some indications from this work follow.

Forests are regarded as beneficial; they affect water resources, environmental conservation, timber production, health/cultural activities, and disaster prevention; but many nations continue to treat headwater forests as timber mines. Deforestation continues apace though a stable forest cover may be the best way of mitigating extreme events such as floods, avalanches and landslides (Haigh et al., 2004). In Alaska, where forests suffered widespread die-back, steep slopes suffering cedar decline had three times as many landslides similar steep slopes in adjacent forests due to loss of root strength (Johnson and Wilcock, 1998). Trees dead for 14-51 years had lost 70-90% of their >30 mm diameter roots, which could reduce soil cohesion by 80%. However, forest functions do not always conform to expectation. For example, forest slopes in the Kumaun Himalaya have a high incidence of landsliding. This is due to the fact that forests survive only on slopes that are too unstable for other development. In Japan, the regeneration of forest on steepland led to increased water loss to evapotranspiration and also reduced total losses of water from the basin. Shibano (1998) found that forest regeneration had dried out the deep forest soils and so reduced deep seepage to ground water. By contrast, Bartarya (1991)
reported the widespread drying up of springs that follows deforestation in the Himalaya and advocated creating ‘spring sanctuaries’ by preserving the forest cover in headwaters. The difference is soil erosion, which eliminated the Himalayan forest soil while, in Japan, a deep weathered layer survived (Ohte et al., 1998). In Serbia’s hills, Kostadinov (1996) found that forest cover between 50% and 70% was essential for effective soil erosion control.

In 1998, Rajwar drew attention to the problems caused by alien plant invasions. Subsequently, Calder and Dye (2001) reported that in water-limited environments, alien invaders, especially trees, may have damaging hydrological impacts. They recommend removing such plants in water-scarce South Africa. However, forest disturbance may lead to increased or reduced runoff or it may have no impact at all.

In general, forests encourage acidification of streams due to the trees’ ability to scavenge cations. The effect is not mitigated by riparian strips, although these may reduce the variability of stream pH. Among several explanations for differences in forest watershed responses to acid deposition are: age of the soil—or at least the degree of disturbance, buffering role of the weathered subsoil layer, geological factors and the role of agriculture, fertilisers and liming.

Nitrogen levels in watercourses are controlled, in the main, by climate, rainfall, atmospheric deposition, and agriculture. Levels of atmospheric nitrogen deposition have been increasing and instances of basin saturation due to atmospheric deposition are increasing. Forest uptake is an important retention process and nitrate levels may rise in winter when the forest biological processes are less active. Nitrate levels are directly related to the cultivated area. One Scottish case study found that increasing the cultivated area from 4.5 to 10% would double nitrate levels in stream water.

Agricultural soil-conservation results from the Balkans show that reduced population pressure and increased forest covers have the greatest impact on sediment delivery to torrents. Sediment loads can be reduced and stream ecology is improved by reconstructing the riparian zone and by reducing pressures, notably trampling and overgrazing by livestock. Riparian functions are also impaired by: fragmentation, timber harvesting, river flow regulation and road construction, all of which must be resisted. However, agricultural soil conservation remains a cost-effective investment. In arable contexts, cover management through crop rotation proved most valuable. Runoff plot based studies from Algeria and Lithuania report soil loss reductions ranging from 30 to 75% and 80% respectively. In Brazil, soil losses through surface wash could be eliminated by no-till cultivation. In China, straw mulching with intercropping, and contour cultivation out-performed no-till on steep slopes.

**Headwater Control Movement (HCM)**

**Compared to other New Approaches in Watershed Management**

Headwater Control is one among several emerging ideologies that compete for the soul of watershed management. It contests a dominant mind-set that still sees watershed management in shallow and mechanistic terms, as a process where different technical experts isolate particular problems or resources for attention. Keidel (1996) has aptly adapted the old parable of ‘the four blind philosophers who describe an elephant’ by sending ‘seven visually challenged experts’ to evaluate a watershed. Individually, they decide that this is perfect for Nature conservation, for recreation, for water supply, agriculture, forestry, fishing and mining—each finds that the land was ‘made’ for their own favoured use beyond all others. These kinds of debates still dominate headwater management.

Worse, current watershed management still aims to resolve problems either by constraining Nature or by taking the functions of Nature into human control. Its key concept is ‘sustainable development’. However, today, there exists a growing practical realisation that the concept of sustainability is flawed. Sustainable, from its roots, means to hold up from below. Something is called sustainable if it is capable of being kept going through repair, maintenance and management through ‘normal’ conditions. Unfortunately, by extension, when such a system is not actively sustained, or when conditions are not ‘normal’, it becomes liable to collapse and, meanwhile, its sustenance becomes a perpetual concern, cost and responsibility. The alternative is to design for self-sustainability and creating systems that can look after themselves, either because their support is inherent in normal pattern of land-use, or because environmental management is returned to the self-sustaining hand of Nature. Headwater control strives for self-sustainability.

The control systems within which the HCM seeks to work with and within are Nature and the local community, which the HCM would empower and engage in the self-regulation of their own habitats. In this respect, the movement epitomises a shift in values across the applied environmental sciences. Stern and Dietz (1994) recognise three current environmental value systems.
`Egoistic` values predispose people to protect environmental attributes that affect them personally. `Altruistic` values subsume concern for environment within the welfare of human society. `Biospheric` grant primacy to all life, including that part which is human. Headwater Control conceives the human component as an integral part of the watershed system and that human welfare is best served by learning to live within Nature and by serving the needs of Nature. It falls on the cusp between the socio- and ecocentric.

Symptomatic of alternative thinking is the FAO’s schizophrenic, top-down, landscape-lifescape perspective as developed in its electronic conference on ‘land-water linkages in rural watersheds’. This reflects a major functional, but ultimately unhelpful, division between those whose primary focus is the physical environment and the impact of its human intruders and those policy makers whose concern is human welfare, which must be wrought against the opposition provided by the inconveniences of the physical landscape and, often, its inhabitants. The ‘lifescape perspective’, called a defining characteristic of watershed management, is founded in the realisation that since the benefits of environmental change are shared between the upstream and downstream shareholders in a watershed, so too should be the costs. Any development of policy, however, is forestalled by the workshop’s wedding to the myth that many popular conceptions of upstream-downstream relationships, as well as the bases of ‘much land and water management policy’ are inaccurate, uncertain or ‘pseudoscience’ (Tognetti, 2000, p. 13). In reality, this uncertainty myth may owe more to the research community’s need to self-justify endless academic studies, whilst simultaneously preserving its scientific mystique and avoiding the political and practical responsibilities of action. In microcosm, it echoes the larger debate about global climatic change. Here, forlornly, the workshop argues that there remains a need to take action on the best evidence available, whilst recognising that this may be partial or incorrect, and at least this is good advice (Tognetti, 2000).

Superficially, the newly emergent applied systems science of “ecohydrology” fits the Headwater Control vision. Ecohydrology purports to examine the tightly coupled interactions between water and life in order to enhance the sustainability of watershed management (Zalewski et al., 1997, p. 13). It was conceived “to accelerate the transition from descriptive ecology, restrictive conservation and over-engineered management of aquatic ecosystems to analytical/functional ecology, creative management and conservation of fresh waters” (Zalewski et al., 1997). In practice, ecohydrology differs from Headwater Control in its academic aspect and its emphasis of water quality and aquatic ecology. One recent typical paper, styled “Ecohydrology: rediscovering freshwater ecology” (Gopal and Chauhan, 2001), may capture an ethos that focuses on Nature but that sees humans as external to the system. There are many papers in the Headwater Control proceedings that could equally be labelled “Ecohydrology”, but the HCM sees human welfare as a central concern.

Closer to the aspirations of the HCM are the various movements for sustainable agriculture, not least the Better Land Husbandry approach, which has grown from recognition that a large proportion of the money invested in conventional technical soil and water conservation and watershed management has been wasted. Structures constructed have not been maintained and land management recommendations introduced to local communities have not been adopted or maintained (Shaxson, 1997). The problem had been that these measures did not sufficiently address the personal needs of the farmer, for whom production is infinitely more important than soil erosion (cf. Hellin and Haigh, 2002).

“Better Land Husbandry” (BLH) is a radical philosophy that aims to transform soil and water conservation into a more effective and positive enterprise (Shaxson et al., 1997). It aims to shift the focus away from soil loss to soil improvement through the management of organic matter and soil moisture, away from technology to ecology, and away from implementing government policy to improving the welfare of the land users (Shaxson, 1996, 1999). Naturally, this work has been pioneered and driven by field practitioners with long involvement in development projects, most notably Francis Shaxson and Rodney J. Cheatle (cf. Hudson and Cheatle, 1993; Shaxson, 1997). In fact, Cheatle’s development projects in the Kakamega, Kenya, provided the motivation for the creation of the ‘Association for Better Land Husbandry’, now absorbed by the Tropical Agriculture Association, but whose meetings provided the vehicle for the development of the BLH philosophy.

The BLH proposals for change affect every aspect of the way in which soil and water protection is conceived and delivered and they affect every aspect of the education and training of future soil and water conservationists. Shaxson’s famous summary of the points of difference between the new and old systems is rephrased here as Table 1 (cf. Shaxson, 1996).
Table 1: Comparing the perspectives of BLH (better land husbandry) with those of traditional soil and water conservation

<table>
<thead>
<tr>
<th>Better Land Husbandry Perspective</th>
<th>Traditional Soil Conservation Perspective</th>
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<tbody>
<tr>
<td><strong>Technical Issues:</strong></td>
<td>The primary concern is the reduction of soil and water losses. This involves undertaking cross-slope conservation works that prevent fertile soils and waters being removed from the site by erosion.</td>
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<tr>
<td>The primary concern is enhancing the productive potential of the soil. This involves managing the soil to improve vitality of its organic system and productive capacity and managing soil moisture availability by optimising rainwater absorption and retention.</td>
<td>Accelerated runoff and erosion are the primary causes of land degradation that leads to unsustainable agricultural systems.</td>
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<tr>
<td>Accelerated runoff and erosion are consequences of unsustainable patterns of land management, especially those that reduce vegetation cover and soil porosity.</td>
<td>Agricultural productivity is related closely to the amount of soil, plant nutrients, and water lost through accelerated runoff and erosion.</td>
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<td>Agricultural productivity is a function of the quality of the soil that remains in the fields.</td>
<td>Erosivity is an inherent property of each rainfall or wind-blow event and its effects must be mitigated by soil and water conservation practices that reduce a soil’s vulnerability to erosion.</td>
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<tr>
<td>The soil is a living system. Its most important inherent property is its capacity to self-regulate and increase, and these soil generating properties must be stimulated by land husbandry practices that favour bio-accumulation in the soil.</td>
<td>Erodibility is, for the most part, an inherent characteristic of each soil type.</td>
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<td>Erodibility is, to a large degree, a consequence of the activities of the soil organic system and of the way in which a soil is managed.</td>
<td>Soil particles and soil particle aggregates are the most important components of a soil’s physical structure.</td>
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<td>Soil pores, where organic activities, air and water movements take place, are the most important aspects of a soil’s architecture. Enhancing the biological production of land is an effective route to conserving soil quality and soil moisture.</td>
<td>Implementing effective controls over soil erosion and runoff is a prerequisite for sustainable agriculture.</td>
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<tr>
<td>Self-sustainable agricultural production is achieved through integrated and interdisciplinary management of the entire agroecological system.</td>
<td>Sustainable agricultural production is underpinned by the mono-technical implementation of soil and water conservation methodologies.</td>
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<td><strong>Socio-economic Issues:</strong></td>
<td>Effective soil and water management requires expertise that can only be provided through specialist training. Farm families need to be educated about the best means of protecting their land and their actions encouraged, guided and supported by specialist advisors.</td>
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<td>Farm families have great expertise in the management of their particular lands and are well aware of the constraints that affect their productive effectiveness: their judgement should be sought and respected.</td>
<td>Sustainable land management strategies are best formulated at national and regional levels. They should focus on modernisation for the enhancement of agricultural production and economic efficiency.</td>
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<td>Sustainable land management strategies are best formulated by and for the rural community. They should focus on measures that promote its abilities to manage its own environment.</td>
<td>Resource-poor small farmers tend to be undereducated, conservative and often irrational. Often, they prove to be careless of the long term sustainability of their land and of the off-farm problems caused by their actions. They need to be made aware of such issues and to adopt more rational and environmentally acceptable land use patterns.</td>
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<tr>
<td>Resource-poor small farmers make rational decisions about allocation of their resources within the ‘envelopes’ of constraints within which they operate; the challenge is to lessen constraints and improve the shape of the ‘envelope’.</td>
<td>Ultimately, rural families will decide what is done on their land, and whether it is in their interests to change according to outside recommendations; resource-poor small farmers are more vitally concerned than any outsider to maintain their lands’ productivity in both the short and long term.</td>
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<td>Ultimately, governments must take responsibility for what will be done on the land, because they alone have the long-term perspective and grasp of the big picture needed to diagnose and implement the fundamental actions that must be taken to maintain productivity and to halt land degradation for the benefit of the whole of society.</td>
<td></td>
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The farming community and the land it occupies is the ideal locus for integrating land management. Technical advisors help farm families identify and overcome the major problems affecting the productivity of their land and its long-term sustainability. Communication of advice and information is a two-way process. Technical advisors have to earn acceptance for their advice by establishing and demonstrating its value.

BLH, therefore, strives to promote systems of farming that meet both the needs of the farmer and those of the soil (Shaxson et al., 1997). BLH shifts emphasis from the volume of soils lost to erosion and the mechanical protection of the soil, to the quality of the soil in the fields and its organic development, and from the needs of the whole watershed to the livelihoods of those who manage that soil through their land husbandry practices (cf. Shaxson et al., 1997; Bunch, 1982). Even though BLH rejects the concept of management at the scale of the watershed, preferring that of the community land holding, BLH is good headwater control. It also illustrates the way ahead through the changing of human attitudes, from ‘control’ to ‘accommodation’ and ‘self-control’, where the long-term sustainability of the human habitat is identified with the health of the whole habitat.

Nairobi ‘Headwater’ Declaration 2002

In September 2002, in the wake of the United Nation’s World Summit on Sustainable Development in Johannesburg, ‘Sustainable Management of Headwater Resources’, the 5th International Conference on Headwaters was held on the campus of the United States International University in Nairobi, Kenya. Conceived as a contribution to the International Years of Mountains 2002 and Freshwaters 2003, this conference’s main concern was to build upon the impetus for environmental management that was initiated at UNCED, Rio 1992, which had affected the way environmental policy is formulated internationally. Hopefully Johannesburg 2002 would do the same? However, as the experience of others demonstrated, it would have been impossible for the Headwater Control Movement to make its voice heard in Johannesburg. The hope was that, locating in Nairobi and assuming the larger status of an independent breakout conference, it would gain a greater impact.

NGOs stand for the belief that they can improve the world by ‘thinking globally and acting locally’. A decade ago, at UNCED (Rio), the NGO Forum produced a set of alternate treaties. These worried about the “erosion of basic values and the alienation and non-participation of almost all individuals in the building of their own future” (UNCED NGO Forum 1993: 5.4). They recognized “the central role of education in shaping values and social action”. This included developing “an ethical awareness” and “a respect for all life cycles” and self-imposed “limits on humans’ exploitation of other forms of life” (UNCED NGO Forum 1993: 5.21). The Nairobi meeting sought to build from this, generating a message to promote the better self-management of headwaters by their human populations and a more self-sustaining integration of the human within Nature. Its output was the Nairobi ‘Headwater’ Declaration (Jansky et al., 2003 and Box 1).

Beyond the Nairobi Declaration

Of course, every conference produces recommendations and the world is filled with the ‘Declarations’ of important international conferences. Most have achieved little. A declaration is no stronger than the ability of those who created it to progress enactment. Inevitably, only a few of the resolutions in the twelve declarations have been advanced directly as a result of this framework. However, the Declaration has been aired at four follow-up events, including the programme planning meeting of FAO in Sassari, October 2003, where it was provided to all 80 delegates. This meeting tackled Declaration items 13, 14 and, hopefully, addressed items 19 and 20 as a consequence of lobbying from Headwater Control delegates.

Progress has also been made towards implementation of aspects of Declaration items 18-20. The first major development arose from the work of one of the Headwater Control Movement’s founding NGOs, the World Association of Soil and Water Conservation (WASWC), a thousand-member professional association of soil and water conservation practitioners and educators. WASWC’s aim is to advance the cause of better land husbandry and better soil and water conservation through integrated land management in...
Box 1: Nairobi “headwater” declaration for the international year of freshwater 2003*

We, the participants in the International Conference on Sustainable Management of Headwater Resources, held in Nairobi (Kenya) on 5-8 September 2002, declare that

1. Acknowledging with gratitude the United Nations General Assembly Resolution No. 55/196 to declare the year 2003 as the International Year of Freshwater, thus drawing the world’s attention to the need to foster sustainable development and management of freshwaters;

2. Noting the outcome of the recent World Summit on Sustainable Development in Johannesburg 2002, where commitments were made “to increase access to clean water and proper sanitation, to increase access to energy services, to improve health conditions and agriculture, particularly in drylands, and to better protect the world’s biodiversity and ecosystems”;

3. Recognizing that headwater regions are sensitive environments, source areas for both surface and groundwater resources, and lands that affect the quality of freshwater supplies;

4. Keeping in mind that headwater regions lie at the margins of both watersheds and, often, social and economic systems;

5. Recognizing also the critical environmental functions of headwater regions and their importance for the livelihoods of both their inhabitants and for those who inhabit lands downstream as evoked in Chapter 18 “Protection of the quality and supply of freshwater resources: application of integrated approaches to the development, management, and use of water resources” of Agenda 21 adapted at the United Nations Conference on Environment and Development (1992), and also as stipulated in its Chapter 13 entitled “Managing fragile ecosystems: sustainable mountain development”;

6. Affirming our concern to mitigate the consequences of the increasing human impact in headwater regions caused by competing demands for water, forestry, agriculture, energy production, tourism, transport and urban development, which continue to affect the environment adversely, not least with respect to the provision of clean water supplies and the maintenance of other hydrological functions;

7. Noting with further concern that policies can impair, seriously and inadvertently, the course of headwater resources management, and that this can create problems downstream for the quality, quantity and distribution of available freshwater resources;

8. Recognizing that sustainable management of headwater regions needs a holistic, integrated approach which respects the needs of all stakeholders in the regions, values and empowers the headwater inhabitants, and which recognizes their central role in the stewardship of headwater systems;

9. Affirming that the sensitive and scientific management of natural resources, supported by improved access to the high quality data required, is essential for fostering development that is not only sustainable, but ideally self-sustaining;

10. Conscious that unsustainable management has negative impacts on the health, productivity, social and economic welfare and ecosystems of headwater regions;

11. Aware of the increasing demand for potable waters that will be required for human health, welfare and well-being, and of the crucial role that headwater regions will play in meeting this demand;

12. Conscious also of the potential negative interactions between the inhabitants of headwater regions and those downstream, caused by competition for the limited resources available in the regions, and aware also that headwater areas accommodate and provide for livelihood of a large number of populations, whose activities and resources consumption may have significant effects on the well-being of those who live downstream;

13. Sustainable development should be the baseline for all environmental policy, planning, management practice, education and law in headwater regions;

14. UN agencies should continue their work with all stakeholders to appraise their situations, to identify gaps in knowledge, needs and constraints, and to support them in their efforts to resolve their problems and undertake practical action towards more self-sustaining and environmentally sensitive development;

15. An ‘international commission’ for headwater management should be established in order to provide direction and continuity for headwater issues and to create an awareness of headwater concerns at governmental level;

16. Priority should be given to the creation of new management structures at all levels, which should be designed to improve the coordination, cooperation and empowerment of all stakeholders of headwater regions, not least to enhance the participation of women, disadvantaged social groups and minority communities, and to tap and develop the full spectrum of local indigenous knowledge relating to watershed planning and management;
Sustainable Management of Headwater Resources

Box 1 (contd.)

17. Greater effort should be devoted to the refinement of methods for generating and sharing the appropriate and reliable information needed for environmental research, planning and management and also for the transfer of appropriate low cost technologies, especially with respect to ‘cushioning’ the impacts of environmental hazards for human populations;

18. Greater attention needs to be paid to the special roles and hydrological functions of headwater wetlands and peat lands, which should be a special focus for future headwater workshops, and also to the impacts of anthropogenic processes on watershed functions in headwater regions;

19. The quality of life for the inhabitants of headwater regions should become a primary concern, including the basic needs for a healthy environment and the regeneration of degraded headwater habitats where required;

20. Greater attention should be paid to applied environmental education aimed at building capacity for headwater management and changing social attitudes against wasteful and polluting uses of headwater resources;

21. NGOs (community-based non-governmental organizations devoted to environmental and/or social uplift) should be empowered to play a greater role in the planning, regeneration and management of headwater habitats, by promoting more efficient mechanisms for financial support for effective NGOs;

22. Greater attention should be given to management of headwaters in arid and semi-arid lands, especially with respect to groundwater management and improved accessibility of potable waters to headwater inhabitants, while one of the main focuses should be to reduce the time wasted in carrying water to households from distant water sources;

23. Attention should also be paid to alternative measures that would reduce the dependence of downstream areas on the resources of headwater areas, including reducing wastage and increasing the efficiency of resource utilization, not least of water;

24. The equitable distribution and use of headwater resources remain a major concern, and planning and management of headwater regions needs to be integrated within the broader framework of watershed management that addresses the concerns of both headwater inhabitants and those downstream.

We therefore call upon UNU, UNESCO, UN-HABITAT, FAO, UNEP, UNDP and other concerned international and national organizations, governments of both developed and developing countries, corporations and NGOs, to facilitate headwater research, monitoring, capacity-building, self-sustaining sustainable development, and better management of the headwater environments, and to help create linkages and synergies in this regard among environmental managers, scientists, communities, policy/decision-makers, practitioners and the general public.

*This conference, which took place from September 5-8, 2002 at the United States International University—Africa in Nairobi, Kenya, was jointly organized by the United Nations University, Tokyo, Japan, UNESCO-Nairobi, the United Nations Centre for Human Settlements (UN-HABITAT), the United Nations Environment Programme (UNEP), USIU and Kenyatta University, Nairobi, Kenya, in collaboration with International Association for Headwater Control (IAHC); International Association of Hydrological Sciences (IAHS); and the World Association for Soil and Water Conservation (WASWC).

vulnerable upland and steepland watersheds. Like the wider HCM, WASWC hopes to bridge the gap between the disciplines of applied environmental management, policy makers, NGOs and the community.

One major current activity of WASWC (Europe) involves its Balkan Group (Declaration, Items 19 and 16), which has held meetings in Beograd, Dec 2002, Sofia, June 2003 with a third being planned for Beograd, July 2004 (Zlatic et al., 2003). This working group strives to reconstruct pre-war patterns of cooperation in watershed management and assess the special problems of integrated watershed management in the troubled Balkan states and northern Turkey, a region which has seen major changes caused by the transition from Socialism, by warfare, and by the formation of many new states—a process aptly called ‘Balkanisation’, which continues to the present day. The region suffers from the massive dislocations caused by these processes, with headwater regions being especially severely affected. Rural depopulation is a widespread problem and there is a major need to revive headwater economies and communities. The WASWC-based working group, aided by seed-corn funding from the United Nations University, is trying to assemble a multinational team and set of projects in each nation, where techniques of better land husbandry and environmental regeneration may be applied, explored and demonstrated.

A second major thrust of the WASWC (Europe) involves education for sustainable development (Declaration Item 20), especially the problem of
communicating the need for socially and environmentally responsible watershed management to the wider community, not least its present and future policy makers and opinion leaders. In February 2003, Resolution 57/254 proposing the ‘United Nations Decade of Education for Sustainable Development (2005-2014)’ was adopted by Second Committee of the 57th Session of the United Nations General Assembly (UN, 2003). This provides good opportunities yet for promoting the changes needed for effective community-fronted integrated watershed management. The Headwater Control Movement argues that this requires education—‘ESD’ Education for Sustainable Development—as its prerequisite. Together, WASWC and the International Association for Headwater Control hope to promote the production of new teaching materials, freely accessible on the internet, and to advance their use to concerned educators at all levels.

The third development has been in response to specific discussion of the inward looking and biodiversity-dominated literature on the role of wetlands in headwaters (Declaration Item 19). The outcome of this has been promotion by the International Association for Headwater Control of a NATO Advanced Research Workshop ‘Environmental Role of Wetlands in Headwaters’, which was organised in Marienbad, Czech Republic in December, 2003. Work continues on the preparation of the proceedings. However, at its final plenary session, the workshop arrived at the following broad conclusions. It was found that, in contrast to those wetlands of lowland areas, the hydrological role of headwater wetlands is neither fully understood nor recognized and their values and potentials tend to be underestimated in national planning documents. The existing systems of wetland protection, based on the RAMSAR declaration and its system of national sites, is inappropriate for the mainstreams of environmental management. A new inventory of headwater wetlands and their functions for integrated watershed management is needed urgently.

The Marienbad workshop concluded that the better husbandry of those watersheds that contain headwater wetlands demands a more complete appreciation of the many roles played by these wetlands within integrated watershed management. However, the realisation of an effective management framework for such headwater wetlands requires a realistic assessment of the role of critical sites, pathways and processes (riparian zones, buffer zones, their size and scale), preferred pathways for run-off genesis and chemical transport, water quantity and quality. This would need to be supported by better educational systems that empowered the more effective participation of headwater communities in integrated watershed management systems that enhanced and conserved both their livelihoods and ways of life. This should be driven by a more focused planning process, which could be based on standard legislative tools supported by EIA (environmental impact assessment) and strategic environmental assessment.

**Conclusion**

Headwater control is about the self-sustainable development and management of the zero to first order basins that provide the margins of every watershed at every scale. It concerns the strategic and scientific research that is needed to make integrated watershed management more effective. It also concerns the development of the strategic management policies that will enhance the self-sustainability of both environmental quality and productive human habitats in headwater areas. Integrated watershed management demands integrated management systems, which are not yet in place in most headwater regions. It also requires empowered participation from all stakeholders in headwater regions, most especially the local land user communities.

Promoting the sustainable management of headwater regions is the guiding purpose of the headwater control movement. Since 1989, this has sought first, to build an international network among those dealing with the problems of headwater regions, then to synthesise the results and views of the participants of this network into a coherent philosophy, and finally, to begin the work of changing international policies towards the management of headwater regions. The movement has sought recognition for the special role that headwaters play in the production of water resources and for the simple fact that problems in the upper reaches of river basins are often communicated downstream. The changes that the Headwater Control Movement commends focus on is promoting integrated, self-sustainable management strategies. Their goal is headwater ‘self-control within the limits of the natural environment’, by informed, properly advised but above all empowered local communities. In recent years, the movement has shifted from its original objectives of scientific investigation and the exploration of ideas towards more overt attempts to affect the direction of international policy. Its first step toward this goal has been publication of the ‘Nairobi ‘Headwater’ Declaration for the International Year of Freshwaters 2003’ (and Mountains 2002), together with securing its endorsement by five United Nations
agencies, led by the United Nations University (Tokyo). This report provides part of continuing work to publicise the ideas contained by this declaration and to seek their implementation.

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