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Environmental Management in Arid Regions: The Question of Water

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***Abstract*—**Only recently have water ethics received focused interest in the international water community. Because water is metabolically basic to life, an ethical dimension persists in every decision related to water. Water ethics at once express human society's approach to water and act as guidelines for behaviour. Ideas around water are often implicit and embedded as assumptions. They can be entrenched in behaviour and difficult to contest because they are difficult to "see". By explicitly revealing the ethical ideas underlying water-related decisions, human society's relationship with water, and with natural systems of which water is part, can be contested and shifted or be accepted with conscious intention by human society. In recent decades, improved understanding of water's importance for ecosystem functioning and ecological services for human survival is moving us beyond this growth-driven, supply-focused management paradigm. Environmental ethics challenge this paradigm by extending the ethical sphere to the environment and thus water or water Resources management per se. An ethical approach is a legitimate, important, and often ignored approach to effect change in environmental decision making. This qualitative research explores principles of water ethics and examines the underlying ethical precepts of selected water policy examples. The constructed water ethic principles act as a set of criteria against which a policy comparison can be established. This study shows that water Resources management is a progressive issue by embracing full public participation and a new planning model, and knowledge-generation initiatives.

***Keywords*—**water resources, environmental management, public participation.

I. Introduction

IF water is scarce, due to reduced availability, accessibility, or quality, how should needs, for both humans and the environment, be met? On what framework can decisions be made? How we meet these challenges is not only a pragmatic choice but an ethical one. Ethics are moral guidelines for human behaviour that function at societal and individual levels. However, conventional ethics embrace only human concerns. Environmental ethics challenges this moral isolation and attempts to include the environment within the ethical sphere. Water ethics is an example of applied environmental ethics.

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UNESCO's series on water ethics is a particularly informative exploration of ethics in water [1], [8], [19]. The Ministerial Declaration from Bonn posits equity and sustainability as the two primary goals for water management. Equity connotes a sense of fairness. Sustainability suggests the idea of maintaining the conditions for and of life into the future. The two concepts are central to realizing better water management. In the UNESCO survey on water ethics [21], proposes that principles "should represent the concepts of sustainable development and environmental justice, which are underpinned by equity: equity between geographical entities, between the industrialized and developing world, between rural and urban populations, between generations and between the managed and the managers". The concept of equity, while an important element of sustainable development as social and intergenerational equity, may become lost among other nuances of sustainability. Distinguishing the idea of equity and sustainability, particularly in the case of water, serves to emphasize the importance of equity. Such separation allows a broader discussion of equity beyond social equity and intergenerational equity to include equity for ecosystems. Nevertheless, in this work the focus is given to the sustainable development as it meets the necessities of the present generation.

II. Principles

The following discussion presents and defines a number of principles to comprise a water ethic and explores what they may mean in practice. Key literature sources for the discussion were the *Dublin Statement* from the International Conference on Water [12]; the Bonn Keys from the International Conference on Freshwater [2]; Selborne's [21] *The Ethics of Freshwater Use: A Survey*; and *Water and Ethics: Overview* by Priscoli *et al.* [19]. These sources contributed to the water ethic principles but each on its own was deemed insufficient to fit Hurka's [11] framework. The *Dublin Statement* on Water and Sustainable Development [12] offers a set of four principles that emerged from discussion at the International Conference on Water and the Environment, Dublin 1992. This *Statement* was prepared for the participants of the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in June 1992. It, and the complementary *Conference Report*, were intended to bring awareness of immediate and future concerns around water and the environment to world leaders and to guide their actions in this regard. The principles relate to water's basic role to sustain life and its limited, vulnerable nature; to the importance of participation of policy makers and the general public; to women's pivotal role in water management; and to water's nature as an economic good while recognizing a basic human right to water [12]. Although these principles are

concise, based on Hurka's framework they are not comprehensive [19]. The contribution of the key sources of literature to the discussion of water ethical issues is illustrated in Table I. Where indicated, the literature source contributes one or more characteristics to the ethical issue. However, this paper is focused on the issues of participation, decentralization, and sustainable development.

TABLE I LITERATURE SOURCES

Principles	Dublin Principles (1992)	Selborne (2000)	Bonn Keys (2001)	Priscoli *et al.* (2004)
Justice		X		X
Availability	X	X		X
Commonality		X		X
Security	X	X	X	X
Participation	X	X	X	X
Decentralization	X	X	X	
Sustainability	X	X	X	X

A. Participation

The empowerment of local people, self-reliance, and social justice are central aspects of sustainability. This statement could not be more relevant than in the case of water management. Because water is essential to all life and is a shared resource, all those affected must be empowered to take part, or somehow represented, in planning, decision making, and implementing action to meet water challenges and arrive at equitable outcomes and to encourage ownership of the chosen path of action. The process of establishing environmental justice can also be important for community building [9]. Perceptions and principles of justice will always be contested either implicitly or explicitly [16], [9]. Acknowledging this makes apparent the significance of developing "just processes to allow this debate to occur in a transparent and participatory way" and involve "multiple voices, environments and knowledge systems" [9]. Based on Dorcey [5]'s definitions of three types of decision making (authoritative, consultative, and negotiative), negotiative decision making is the most empowering form of public participation because it involves negotiating trade offs among the participants, rather than authorities consulting the public and then imposing a decision. Mitchell [17] suggests four reasons for authentic (negotiative) public participation: participants can define the problem more effectively; participants can bring information (local knowledge) from outside scientific or government understanding into the discussion; participants can identify socially acceptable alternative solutions; and participants will have a sense of ownership over the solution and be more willing to comply with implementation.

These transparent partnerships can lead to creative solutions, better outreach, and informed citizenry [2]. Inclusion of local knowledge builds social and human capital and allows solutions to be more culturally and socially appropriate [21]. Dialogue between stakeholders assembles expertise and explores "the room for consensus, compromise, agreement, and concerted action among widely diverging scenarios and futures that are being envisioned by the stakeholders. Dialogue, then, facilitates change processes" [20]. Overall, the complexity of problems can be better addressed.

The complexity of water issues makes authentic public participation especially important. Thus a water ethic should include the participation principle. Decision making—in the normative, strategic, and operational stages of analysis and planning [17] —should include all stakeholders and be interdisciplinary [19]. All affected, including the poor, women, and all levels of policy makers, should be considered stakeholders [19], [12]. These partnerships will create "water wisdom", educate citizens who can prevent corruption, clean up watersheds, find innovative solutions, and develop new technologies while involving traditional and indigenous knowledge [2].

Yet, not only does the shared nature of water mean full participation is essential, but water can also be a tool for community development, peace building, and preventive diplomacy [21]. Although some people fear that "increased citizen participation will lead to polarization and conflict, at the expense of positive outcomes" [9], cooperation and negotiation over water issues may reduce polarization and lead to a stronger, more understanding, and even more unified community through "a convergence of interests" [20].

Limitations to the participatory process, which can be time intensive, can include the necessity to meet short-term needs, the lack of cultural precedence of participatory approaches to decisions making, or some individuals' self-concept (e.g., lack of confidence) inhibiting participation, or they may not know how to participate meaningfully [10]. Other limitations include availability of resources.

B. Decentralization and Representation

For equitable and sustainable water-use management, the Bonn Keys advocate decentralizing water management to the local level, "where national policy meets community needs" [2]. This idea builds on the *Dublin Statement*'s call to decentralize decisions to the lowest appropriate level [12]. This decentralization brings improved responsiveness to problems, better transparency, and fuller participation [2]. As part of decentralization, cooperative governance within watershed boundaries will best build harmonious relationships with nature and neighbours [2]. Decentralizing decision making allows better integration of local knowledge rather than total reliance on imported methods that may be inappropriate for the community [21]. All individuals and groups, whether rural or urban residents, rich or poor, empowered or disempowered, should have the opportunity to participate in water-use decision making and management. Mitchell [17] describes a stakeholder as "a person or group directly affected by or with an interest in a decision, or with legal responsibility and authority relative to a decision". Formally or informally, all who are, or will be, affected by the decisions should be acknowledged as stakeholders and be active in the decision-making process. The most vulnerable groups are especially important to acknowledge and include

because they may be most affected by problems [19]. As Hillman [9] states, "exclusion of marginalized or even just 'irrelevant' groups, such as indigenous people, women, young people and trade unions, from decision making runs the real risk of promoting disciple-bound abstractions of environmental decision making removed from its contextualized 'real world' complexity". This inclusion of all groups is a central concern of environmental justice.

Specific groups of concern include women [19] —as in the *Dublin Statement* [10]. Participatory mechanisms should address women's specific needs and empower them to participate at all levels [10]. Indigenous groups have generally been historically disenfranchised and only in recent decades have reconciliation processes begun to acknowledge this. Rights to water and participation in water-use management decision making is one area of such reconciliation which has not received much attention in the water ethics literature. However, representation and full, meaningful participation of indigenous groups is essential to ensure environmental justice in water-use decision making. Other "groups" that require representation are future generations and nature. These groups are clearly more problematic to include in decision making given their inability to speak for themselves. Youth participation may represent future generations because they are the next generation. Highlighting the importance of future generations or nature as central explicit principles in water policy and management can effect some degree of 'participation' by future generations or nature. Representation for nature also arises in the form of environmental non-governmental organizations and individuals—champions of altruistically defined environmental interest. Education and awareness campaigns can also assist with attention to the unvoiced future generations and environment. Rather than only considering the voice of those who can participate in decision making, the ecosystem justice approach more strongly advocates the consequentialist approach where just outcomes are favored over just procedure [4]. This approach is because the moral relationships among all members of the ecosystem (human and nonhuman) can only be defined in terms of the members' state of being (or flourishing) and the state of the system as a whole [4].

C. Security

Water security is not a global phenomenon or equitable. The issue of security—be it physical, psychological, economic, or military security—"is one of the enduring sources of passion in policy controversies" and generally revolves around the question of need [22]. Thus water security is about meeting needs for water. Clean water for drinking and cooking (about100 liters per day per person [1]) meets basic physical needs and nourishment requirements. Water for healthy sanitation systems meets the need for basic dignity, privacy, convenience, and fends off disease through hygiene. Human dignity is an important principle in a water ethic [19]. Thus all humans have a positive right to access sufficient amounts of clean water for drinking, cooking, and hygiene. Inequitable access particularly affects marginalized segments of society. Thus, one of the Bonn Keys' five principles is ensuring water security of the poor [2]. Boyd [3] describes some important aspects for comprehensive drinking water protection: drinking water source protection; safe distribution systems; testing; public notice and information; and sufficient financial resources for operation, maintenance, and upgrading water treatment systems [3]. Moreover, primary economic uses of water tend to be agriculture, manufacturing and other similar industrial uses, and power generation. With this access to water, however, comes responsibility to protect that water and other users. Weak governance swaying to the economic imperative, industry managers' lack of awareness, and the use of inefficient or inappropriate technology often collude to prevent responsible industry [24]. Governments have the responsibility to create and enforce effective regulatory frameworks of policies, laws, subsidies, incentives, and generally set standards [21]. Given the growing trend of transnational corporations transcending regulations, transnational corporations and industry should be accountable and bound to ethical guidelines, like governments [21].

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D. Sustainable Development

In the UNESCO survey on water ethics, Selborne [21] proposes that principles "should reflect the concepts of sustainable development and environmental justice, which are underpinned by equity: equity between geographical entities, between the industrialized and developing world, between rural and urban populations, between generations and between the managed and the managers". The *Brundtland Report* [27] and Agenda 21 from the United Nations Conference on Environment and Development (UNCED Earth Summit), in Rio de Janeiro, 1992, popularized and lent international legitimacy to the concept of sustainable development. The *Brundtland Report* defined sustainable development as human development that "meets the needs of the present generation without compromising the ability of future generations to meet their own needs" (WCED 1987, 8). Agenda 21 recognized humanity's dependence on the natural environment and thus the necessity to protect it for current and future generations [23]. Agenda 21, followed by various other international conventions and agreements, strengthened the commitment to sustainable development and recognised that water and other natural resources must be managed for the benefit of future generations. Intergenerational equity is important for the shift from short-term thinking to long-term planning. Sustainability extends moral consideration to the future. Mitchell and Shrubsole [17] suggest that sustainable development embodies the following aspects: meeting basic needs; maintaining ecological integrity and diversity; merging environment and economics in decision making; keeping options open for future generations; reducing injustice; and increasing self determination. Because traditional water management approaches have often been about controlling situations and concrete supply-side solutions [7], [18], growing uncertainty have made such approaches less desirable. Adaptive management has become a more appealing approach [21]. Although representing future generations is important but difficult. Youth representation and explicit recognition of needs of future generations as an ethical principle are two approaches to this challenge. The idea of stewardship may also contribute to "caring for" future generations. Stewardship

"directs attention not only to the necessity to manage water to meet basic needs for a variety of interests, but also to ensure that water is protected and conserved, and that its uses and values are sustained" [17], implicitly for future generations.

III. Conclusions

For human settlement feasibility and ecosystem health, water's finite and variable nature requires environmental management and protection of its sources from overuse and pollution. Because of water's nature as a common-pool resource, sharing among users and uses must be devised with equity and sustainability in mind. Moreover, intergenerational equity is at the basis of water security to meet basic water needs for drinking, cooking, sanitation, and basic food security. Furthermore, an ethical argument was objectively constructed for explicit address of water resources management and an expanded sense of moral consideration in decision making.

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References

[1] Acreman, M. 2004. *Water and Ethics: Water and Ecology*. United Nations Educational, Scientific and Cultural Organization (UNESCO): Paris.
[2] Batz, F. J. (ed). 2001. *Conference Report.* International Conference on Freshwater. Secretariat of the International Conference on Freshwater, Bonn, Germany.
[3] Boyd, D. R. 2003. *Unnatural Law: Rethinking Canadian Environmental Law and Policy*. UBC Press: Vancouver and Toronto.
[4] Brunk, C., and S. Dunham. 2000. Ecosystem justice in the Canadian fisheries. In H. Coward, R. Ommer, and T. Pitcher (eds). *Just Fish: Ethics and Canadian Marine Fisheries.* Institute of Social and Economic Research: St. John's, Newfoundland. Pages 1–37.
[5] Dorcey, A. H. J. 1991. Conflict resolution in natural resources management: Sustainable development and negotiation. In J. W. Handmer, A. H. J. Dorcey, and D. I. Smith (eds). *Negotiating Water: Conflict Resolution in Australian Water Management.* Australian National University, Canberra. Pages 20–46.
[6] Fry, A. 2005. Water: Facts and Trends. World Business Council for Sustainable Development. [Online] www.wbcsd.org.
[7] Gleick, P. H. 2000. The changing water paradigm: A look at twenty-first century water resources development. *Water International* 25:127–138.
[8] Hassan, F. A. 2004. *Water and Ethics: A Historical Perspective*. UNESCO: Paris.
[9] Hillman, M. 2004. The importance of environmental justice in stream rehabilitation. *Ethics, Place and Environment* 7:19–43.
[10] Hochachka, G. 2005. Developing Sustainability, Developing the Self—An Integral Approach to Community and International Development. POLIS *Project on Ecological Governance and Drishti, Centre for Integral Action*: Victoria.
[11] Hurka, T. 1993. Ethical principles. In H. Coward and T. Hurka, (eds). *Ethics and Climate Change: The Greenhouse Effect*. Wilfred Laurier University Press: Waterloo. Pages 23–38.
[12] International Conference on Water and the Environment (ICWE). 1992. *The Dublin Statement on Water and Sustainable Development.* International Conference on Water and the Environment: Dublin, Ireland. [Online] http://www.un-documents.net/h2o-dub.htm
[13] International Law Association (ILA). 1967. Helsinki Rules on the Uses of the Waters of International Rivers. International Law Association: London. [Online]http://www.internationalwaterlaw.org/IntlDocs/Helsinki_Rules.htm. Accessed February 2006.
[14] Lee, K. 2005. Is nature autonomous? In T. Heyd (ed). *Recognizing the Autonomy of Nature: Theory and Practice.* Columbia University Press: New York. Pages 54–74
[15] Low, N., and B. Gleeson. 1998. *Justice, Society and Nature: An Exploration of Political Ecology*. Routledge: London and New York.
[16] Low, N., and B. Gleeson. 1999. *One Earth: Social & Environmental Justice*. Australian Conservation Foundation Inc.: Fitzroy, Australia.
[17] Mitchell, B., and D. Shrubsole. 1994. *Canadian Water Management: Visions for Sustainability*. Canadian Water Resources Association: Cambridge, Canada.
[18] Postel, S., and B. Richter. 2003. *Rivers for Life: Managing Water for People and Nature*. Island Press: Washington.
[19] Priscoli, J. D., J. Dooge, and R. Llamas. 2004. *Water and Ethics: Overview*. UNESCO: Paris.
[20] Rijsberman, F., and A. Mohammed. 2003. Water, food and environment: conflict or dialogue? *Water Science and Technology* 47:53–62.
[21] Selborne, L. 2000. *The Ethics of Freshwater Use: A Survey*. UNESCO: Paris.
[22] Stone, D. A. 2002. *Policy Paradox: The Art of Political Decision Making*, Revised edition. W.W. Norton & Company, Inc.: New York.
[23] United Nations (UN). 1993. Agenda 21: Earth Summit—The United Nations Programme of Action from Rio. [Online] http://www.un.org/esa/sustdev/documents/agenda21/english/agenda21toc.htm.
[24] United Nations (UN). 2003. Executive Summary: Water For People, Water For Life: UN World Water Development Report. United Nations: London.
[25] United States Environmental Protection Agency (USEPA). 2006. Environmental Justice. USEPA. [Online] http://www.epa.gov/environmentaljustice
[26] Wenz, P. S. 1988. Environmental Justice. State University of New York Press: New York.
[27] World Commission of Environment and Development (WCED). 1987. Our Common Future. Oxford University Press: Oxford and New York.