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Water, Cultural Diversity, and Global Environmental Change

Emerging Trends, Sustainable Futures?



United Nations
Educational, Scientific and
Cultural Organization



International
Hydrological
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Foreword

The Water-culture-environment nexus: Practical lessons from the field

Richard A. Meganck

This book is the product of many experts on all aspects of the water/culture continuum. I am not yet another expert, particularly on the cultural aspects of water. I am a surface water hydrologist who has worked in international water management and water policy development. I spent the last six years of my active United Nations career as an administrator of an institute of higher education to train the next generation of water specialists. UNESCO-IHE has awarded in excess of 15,000 MSc and PhD degrees to professionals from 162 countries in its 51-year history. That experience has given me tremendous insight into the many varied cultures of water that comprise the mosaic of how we use and misuse this most precious of the world's resources. And so it is from this perspective and experience that I address my remarks to you, the reader.

Consider this: A woman drops a bucket into a dry or contaminated well in northern Africa. A family watches its home vanish beneath a new reservoir in Asia. A priest baptizes a newborn in South America. A monk washes an image of Buddha in Thailand. A woman and her daughter set out on the daily search for water in Mongolia. An Indian family disperses the ashes of a loved one into the winds above the Ganges river. A farmer kicks the salt-crusts soil poisoning his fields in Australia and ponders his fragile economic future. Policy makers in Saná, Yemen, debate what response should be forthcoming as the water table of the city drops by more than six metres each year. A man in New Orleans, USA, watches as his home of 50 years is consumed by the rising floodwaters.

In all corners of the globe people confront both opportunity and tragedy related to water. Sometimes too much water, sometimes too little. But increasingly, the presence of or absence of water is chaotic, with less predictable patterns that produce local disasters of all sorts.

Water is the tie that binds every thing, both animate and inanimate regardless of the outcome. It is not an overstatement that a river reflects the life and memory of

any country or region. Water is mystical, religious, powerful, revered and feared. That range of descriptors itself defines the very essence of this book – that nexus where water-culture and the broader environment interact. And as I reflect on the importance of forcing these cross-discipline interactions, I can't help but think about how decision-makers, educators and students, will benefit from being exposed to this broad continuum of ideas.

It goes without saying that water and development, and by that I mean water and the advance of the human species, are two sides of the same coin. From the beginning of time, water has played a fulcrum role in where societies migrated and settled and how they interacted. Even to the casual observer it is obvious that the accumulation of knowledge about nature by communities has impacted how we have dealt with the very resources upon which we depend – our water, air and soil, and in turn, how those resources have impacted the evolution of cultures. The historical complexity of this nexus – water, culture and environment – is captured in Pietro Laureano's *The Water Atlas*. Others have documented the results of natural resource management decisions at the societal level. For example, Sandra Postel points out in her 1992 book *Last Oasis* that we are entering a new era of water *scarcity*, but also documents that we have only infrequently and only recently considered the intimate ways in which water affects other aspects of our development such as food security, industrialization, international relations, and the growth of cities. We always assumed water was there for the asking, for the taking by anyone, at almost anytime and in seemingly unlimited quantities. And many people expected water to be provided free of charge. As Postel notes, unless citizens insist on policies, laws and institutions that promote sustainable water use, we will face even more drastic changes than have been forecast. Water stress will turn into water scarcity with more frequency and with greater impact. Water refugees will become an even more common phenomenon. And while water conflicts have been infrequent in the past, they are anticipated to escalate, prompting growth in the numbers of 'hydrological refugees'.

Without question environmental damage, localized climate change, rapid population growth, unpredictable trading partners, and pressures from enemies were all factors in the demise of historically doomed societies, but still our earlier incarnations found solutions to those same problems and persisted. However, while history provides a perspective on the consequences of action (or inaction) in response to local and regional crises, the problem today is that the nature of our crises are now global in scale and require an unprecedented level of cooperation to understand, let alone resolve. The management of a watershed is all the more complex when you consider that there are some 263 major transboundary rivers in the world. Even the oceans were not conceived of as an integral unit by large masses of the population until we saw those incredible photos taken from space for the first time – a short four decades ago.

Ours is indeed the water planet. That scenario is fast changing and has engendered an active debate about the responsibilities of water rich countries to water poor countries, trade in virtual water, water footprints at all geographic scales, a water futures market, among many other new soft and hard technologies to deal with new complexities and urgencies. Related to these debates are the questions of how best

to organise ourselves – financially and technically – to attack a problem that is global in scale yet presents so many varied local manifestations? How to organise ourselves to fully identify and comprehend the range of sustainable alternatives? How to structure a process that results in decisions that are implementable?

Answering these questions requires a broad and nuanced understanding of the integrated nature of the major environmental and cultural problems that we humans face.

Let me provide a personal illustration here.

In 1969, after completing my Masters degree, I joined the U.S. Peace Corps and was assigned to work in Colombia, South America on water problems in the Amazon drainage. People lived for millennia with the seasonal changes that resulted in flood and relative drought cycles. But what changed when the forestry industry became a global concern and the demand for precious hardwood insatiable was remarkable. Not only were the flood and drought cycles more pronounced, but traditional patterns of living were abandoned and replaced with a more modern lifestyle. Entire economies were impacted and of course access roads brought in tremendous amounts of investment and environmental damage. And the damage was not only to the resource but to the structure of the affected communities. Poverty became more pronounced and outside influences caused small communities to grow wildly and without forethought or at times disappear. Of course this was going to happen. How could we expect any region to transition at such a fast pace without time for understanding or adjustment?

In 1974, after completing my PhD, I joined the Organization of American States. A few years later I transferred to the United Nations where I was sent to the desert of Northern Mexico to plan an ecological reserve. Yet nobody living there was interested in an ecological reserve. Only the funding agency, the Inter-American Development Bank, was interested in this concept. The only thing the farmers of this region were interested in was water. It took six months for their message of human need to change my way of thinking. Over time we managed to raise the funds for a commercial scale well, and the farmers abandoned their overgrazing and over-tree-harvesting economy to return to what they were really were good at – growing beans. And their bean production tripled in a single year. They got rid of their goats and stopped cutting and selling firewood. Once their livelihood was secure, the farmers had an interest in seeing an ecological reserve established and over the next three years we planted 3 million pine seedlings. Today, there is a seedling survival rate approaching 70% and the watershed is being restored with the active participation of the local community and with the assistance of The Nature Conservancy, a U.S.-based non-governmental organization.

The point of these examples? We humans have some degree of control in the human/environmental equation. We can choose to make decisions that change action and behaviour – and in these changes help restore and sustain the environment. Both of these experiences taught me that you can't assume that making a decision about any individual sector will not impact other parts of the community. Humility and the willingness to observe and listen are two of the most important tools any field scientist can have in his portfolio.

I could mention many other stories such as the impact of women and girls primarily in Africa having to dedicate an average of four hours each day collecting fuel and water – this total resulting in a loss of some 40 million productive working days each year. I could mention that the reason the United Nations Children's Fund has invested so many resources into drilling wells at schools throughout Africa is that the lack of water for personal hygiene is the principal reason why young girls drop out of school once they reach puberty. Imagine the impact to any culture of that trend. I could note the impact that millions of people suffer from having to drink arsenic-laden waters or the fact that more than a billion people must survive drinking contaminated water and more than two billion live without any sanitation services. The statistics can at times be overwhelming.

Rather than continuing along that line, please permit to focus on a few concluding comments and questions that I hope you will keep in mind as you turn your attention to the following chapters in this book.

1. The North-South, South-North and even the South-South continua for sharing experiences still seems to be more of a barrier than a bridge to learning. Yes, there are many bright spots and our ability to network in ways that were inconceivable only a decade ago has helped tremendously. But why is it that we continue to exchange experiences but find it so difficult to adapt our technologies and policies based on the trail and error of others? Donald Worster in his now classic work *Rivers of Empire* referred to this syndrome as the 'hydraulic trap'. Of course he was comparing the promise of engineering to solve all problems and the difficulty of pushing any new technology through a political process. I have heard a similar concept referred to as 'policy arrogance' in UN meetings; the we-know-what-is-best-for-you syndrome. Here I would also add the burden of conditionality demanded by the development banks. And at a time when the North is every bit as vulnerable as the South to the ravages of global change, I maintain that the South may have many of the solutions the North needs.
2. We cannot continue to isolate natural science from social science in debating what is sustainable and expect logical outcomes. We need a common language, and we need the patience and respect to recognise a common language cannot be achieved without broadened our understanding of reality and perspectives of reality. As a retired employee of UNESCO, I might also ask: Are the three keys to sustainability (as promoted by UNESCO) – science, culture and education – achievable when one part of the house has no idea what another part of the house is involved in? This book is meant to encourage a shift in thinking – that sustainable futures require embracing the challenge of cross-discipline and cross-cultural communication. The first step is to listen, with respect.
3. Our ability to analyze massive amounts of trend data provides us with an opportunity to look to the past and indicate alternatives as to the future. We have the very tools at our disposal to begin to comprehend the impacts of decisions taken today on our lives and those of our children. We must begin to use this information in cross disciplinary ways to our benefit, rather than trying to convince decision makers that history can teach us something about the future. That is still a very difficult goal to sell in the marketplace.

4. Hydrological poverty is a reality in many parts of the world and it will drive more change than culture will – given the absolute need for water. Most of the nearly three billion people to be added to the world's population by 2050 will live in countries where water tables are already falling. The international community together with the private sector must address these issues head-on to avoid civil unrest and new 'Rwanda's' catalyzed by a lack of water and protein.
5. Money alone will not solve the problems of water or environmental management, and in many contexts may be the source of old and new evils. Consider the aid and corruption continuum. New technologies such as trading in virtual water, water being considered a vital part of Official Development Assistance, the buying and selling of water futures may, if carefully crafted, offer an opportunity to link development assistance with lending and granting policies while helping to ensure that assistance gets to those who need it.
6. Finally, I continue to believe that solving our environmental problems and improving the understanding of the relationship between water and culture is through education. It must be part of any solution, but in this case we cannot hope to improve water management unless we invest in the future of the sector. If Africa has any hope of complying with the UN Millennium Development Goals regardless of the date, it is estimated that a 300% increase in the number of trained water professionals is required. The situation while a bit better in Asia is still daunting as a 200% increase is projected. Latin America will require a 50% increase in the numbers of trained technicians and professionals. And even the OECD countries are finding that with the wave of retirements planned for the next 10 years they will fall far short of the numbers of trained personnel. How can we have any hope about the future if we do not invest in what is obviously needed today?

I want to end this foreword with a short poem. It comes from the book *Wind, Water and Stars* by Antoine de Saint-Exupéry.

*Water; you have no taste, no colour, no scent,
one cannot describe you,
but only enjoys you without knowing you.
You are not something that is needed for life; you are life itself.
Your fulfillment of the sense of happiness,
that, cannot be explained by senses only.
With you all the powers from
which we have distinct counsels come back to us.
You are the most precious wealth in the world
and yet you are also the most fragile one.
So pure, emerge from the womb of the earth.*

Thank you.

Preface

Water is the essential lifeblood of our planet, with the power to generate, sustain, receive, and ultimately to unify life (UNESCO-IHP 2009)

Culture takes diverse forms across time and space. This diversity is embodied in the uniqueness and plurality of the identities of the groups and societies making up humankind. As a source of exchange, innovation and creativity, cultural diversity is as necessary for humankind as biodiversity is for nature. In this sense, it is the common heritage of humanity and should be recognized and affirmed for the benefit of present and future generations (UNESCO Universal Declaration on Cultural Diversity, 2001, Article I).

Cultural diversity is crucial to environmental sustainability; it generates the multiple human possibilities necessary for generating sustainable adaptations in a changing world (UNESCO-IHP 2009)

The above statements express the core concerns and guiding principles of this book. The essays and cases explored in *Water, Cultural Diversity and Environmental Change: Emerging Trends, Sustainable Futures?* project a view of the world that sees no inherent separation between human cultures and the environment in which they reside. Indeed, water serves as a unifying element: it is a substance (H₂O) in gas, liquid and solid form; it is an agent, a transformative force, a realm, a source of life and death; and, in a human sense, water can be an entity, an idea, a source of power and wealth, of misery and woes, or inspiration and joy. Human history and the evolution of culturally diverse understandings and ways of life reflect in many ways our interactions with, need for, and use of water. Because culture is learned, lived, and expressed in broader social relationships, it is a significant dimension in the factors that shape both conflict and consensus in understanding, valuing, using, and managing water. Our collective and individual needs for water form a basis for both collaboration and conflict.

It is with these understandings in mind that we have shaped the core questions of this book: What are the roles that water plays in sustaining diverse forms of human sociocultural life? What roles do diverse human societies and cultures play in valuing, managing, preserving and using water and its associated ecosystems? What are the consequences of these resource relations in sustaining, or undermining the means to

sustain, the viability of human communities and their environments? Recognising that the crises we face have been largely generated by human action, particularly human activity guided by capitalist, managerial and technoscientific cultures, at what point and in what contexts are cultural values and behaviour appropriate or inappropriate? The traditional knowledge, stewardship and management systems, and technologies developed by different peoples typically reflect the deep relationship between biological and cultural diversity. Might these time-tested strategies help meet the complex needs of a changing environment?

The core concepts utilized in this book draw upon a larger trend in sustainability science, a recognition of the synergism and analytical potential in utilizing a coupled biological and social systems analysis which is urgently needed, as the functioning viability of nature is both sustained and threatened by humans. Our emphasis on cultural diversity means that this book is deliberately wide in scope and form, sampling an array of case studies, ideas, images, issues and activities from across the globe. We also hope that, by presenting such a collation, we encourage further exploration, both of the specific examples, and of the wider concepts and ideas presented. Alongside its conceptual and empirical contributions, this book is intended as a call to action, but also as a window to a wider series of actions already underway.

The UNESCO-IHP Water and Cultural Diversity Project

As part of the Water and Cultural Diversity project by UNESCO's International Hydrological Programme (UNESCO-IHP), an expert advisory group on Water and Cultural Diversity was formed in January 2008. Over the subsequent 2 years, the group worked to refine UNESCO-IHP's Water and Cultural Diversity project mission, identify goals and implementation initiatives, draft brochures, white papers, and policy statements, participate in meetings and conferences, and assist in the development of an international Community of Practice (CoP) engaged in defining and asserting sociocultural perspectives in water sciences and management. Members of the Water and Cultural Diversity expert advisory group came from both academic and community activist backgrounds and included practitioners with skills in anthropology, community advocacy, development, ecology, forestry, engineering, ethnobotany, geography, hydrology, philosophy and Indigenous studies. Participants came from Australia, China, Canada, India, Japan, Mexico, Nepal, the Netherlands, Paraguay, Sierra Leone, the United Kingdom and the United States, while institutional project partners included the United Nations University-Institute of Advanced Studies Traditional Knowledge Initiative (Darwin, Australia) and the Research Institute for Humanity and Nature (Kyoto, Japan). This book is a major collaborative outcome of the relationships created and the work undertaken during the life of the expert advisory group and of the broader UNESCO-IHP Water and Cultural Diversity project.

Water and Biodiversity: A Global Crisis

In late 2010, a cover story in the journal *Nature* drew renewed attention to the relationship between the use and misuse of rivers and the degenerative consequences for humanity. Among its conclusions are the harsh facts that the cumulative impacts of dams, pollution, agricultural runoff, the conversion of wetlands and the introduction of exotic species have led to a situation in which some 80% of the world's population – nearly five billion people – live in areas where river waters are highly threatened. Much of the industrialized world faces a massive decrease in biodiversity due to loss of habitat, decreasing ecosystemic integrity, and the diminishing quality and availability of water. These impacts are spreading through newly industrializing areas, and water security is now under extreme threat in many regions, destabilizing individual health, cultural integrity and diversity, and the social and political relations within and between nations.

Mapping the threats to water security for both humankind and biodiversity has allowed scientists to graphically demonstrate the intersect between water, biodiversity, and human security, and their conclusions are clear: the world itself is in crisis. This crisis is more than a matter of supply and demand; it is also a crisis in access, with the inequities in access to water further separating the rich from the poor. And it is a complex crisis, as actions to address human needs often come in conflict with broader biodiversity and river health concerns. Remote areas where water and biodiversity is plentiful are attractive for energy development and water security potential, yet such actions not only threaten biodiversity, but also long term global water security and transnational security (Palmer 2010:534; Vörösmarty et al. 2010:555–561).

Other research conducted by the United Nations Environment Programme and the WorldFish Center demonstrate how truly significant freshwater fisheries are in providing food and economic security for tens of millions of the world's peoples, an estimated 100 million people in Africa alone. Inland fisheries are for many of the world's people the primary source of dietary protein and other essential nutrients. Yet, climate change and other forces are generating rapid environmental changes in the world's freshwater systems, changes that are having a marked degenerative effect on fresh-water fisheries (Dugan et al. 2010).

Similar concern for the rapidly escalating rate of species extinction was expressed at the United Nations Convention on Biological Diversity meeting in Nagoya, Japan in October 2010, resulting in the adoption of a consensus agreement on how best to conserve, protect and share the world's biodiversity resources. The Nagoya Protocol includes recognition of the relationship between unsustainable uses of inland water resources and biodiversity, and includes pledges to expand protect areas to 17% of land (including inland waters) and marine protected areas to 10% of the oceans by 2020 (Convention on Biological Diversity 2010).

Achieving the stated goals of this agreement, as is the case for other areas of international concern, requires aggressive action, a commitment to deprioritize short-term benefits (that often meet human needs) over long-term gain (that sustains a functioning ecosystem), and significant political will. Implementing this global

environmental agreement will not be easy, given the significant link between biodiversity, water and other critical resources often found in such settings, and the rise of violent conflict. A 2008 study published in the scientific journal *Conservation Biology*, for example, mapped the global location of war over a 50-year period in relation to biodiversity hotspots. The study's conclusion: more than 80% of the world's major armed conflicts during the last half-century have taken place in some of the most biologically diverse and threatened places on Earth (Hanson et al. 2009).

Is it possible to chart a way forward that ensures that human needs and desires and biodiversity concerns are addressed in peaceful and sustainable fashion? Authors in this collection of essays and case-specific vignettes argue that such outcomes are indeed possible, especially when actions taken recognize and respect the role that water plays as the lifeblood of this planet. We argue for a coupled social and biological systems approach to water management, one that acknowledges and sustains the synergistic links between water, biodiversity, and cultural diversity.

Core Concepts and Tools

In keeping with the intent to promote both diversity and constructive action, this book offers an array of ideas, concepts, and tools to understand and manage the sociocultural implications of the growing water crisis, and to suggest alternative pathways to sustainability. Some of these concepts and tools have only been developed recently, whilst others have a considerable history behind them. While there is no one model, precept, or concept that will be universally applicable and effective in every circumstance, there are certain universal conditions and constructs that can be recognized. These are briefly outlined here, and explored in more detail in the case studies themselves.

Cultural Ways of Life

Culture is a universal. All humans have learned behaviour expressed in the patterns we call culture. These learned patterns of behaviour serve many functions, not the least of which is the ability to interact, engage, and adapt to changes in the environment and in society. *Cultural ways of life* are also universal. We all have ways of understanding, engaging, communicating, sharing, and reproducing our knowledge, values, beliefs, and expressions. While all cultures evolve and change, the means to support and sustain a cultural way life may be destroyed, and this destruction can have profound impacts on the ability to utilize and reproduce culturally-distinct knowledge, values and traditions.

All culturally-distinct communities, indigenous and otherwise, are unique, yet also share certain commonalities. Many communities enjoy a way of life that sustains

the local environment while nourishing the social relationships and cultural meanings that define their community. The production and reproduction of a way of life involves a way of knowing that is a result of a long-term systemic interaction between people and their surroundings. This knowledge is rooted in cultural practices and spiritual values and enshrined in customary laws. These biocultural experiences and relationships have over the millennia enabled human groups, and the environs on which they depend, to survive and thrive.

Across time and space, human communities – through their varied ways of life – form and shape a vast and complex mosaic of ecosystems. This diversity, and its potential for providing both adaptive capacity and the sustainable use of the resource that is the lifeblood of the planet, may well hold the key to our future. Monocultures for example, may be highly productive in particular ways over short periods but they are inherently vulnerable to unforeseen variability. Such variability, particularly in a climatic sense, is an increasing part of the contemporary world. Yet, while they represent sources of adaptive diversity, local place-based cultures are also vulnerable to large-scale or ill-considered change. While adaptation and change is a normal part of cultural transmission, the sustainability of cultural ways of life depends heavily on the maintenance of some strong continuities. When the means to support and sustain cultural continuity is destroyed, we suggest that destruction is not just immoral and/or illegal; it lessens the diversity and therefore the adaptive capacity of humanity as a whole.

Thus, in exploring the linkages between water, cultural diversity and environmental change, we are especially concerned here with the role of culture in affecting water quality, in shaping patterns of water access and use, and in the complex consequences of these *resource relations*, especially the ways in which culturally-informed behaviour sustains or undermines the viability of our planet and varied life that it supports (Donahue and Johnston 1998). In too many instances we see the development and management of water resources, and the related environmental degradation and displacement of previously cohesive communities, as a significant threat to the means that sustain communities and culturally-distinct ways of life.

Water Cultures and Waterscapes

Everything is culturally mediated, in all societies. Economic activities; politics; the way we think about and interact with the material environment. And every social group and every actor in society has a cultural engagement with water. Some of this human/water engagement is manifested in the form of *water culture*: the knowledge, traditional customs, and behaviour that support the development and reproduction of a stewardship ethic, or the political organization of societies to manage and maintain water resources. Other aspects of the human/water engagement are manifest in the form of *waterscapes* – where human imagination and endeavour produces a material form which contains, shapes, moves, disperses, reveres and celebrates the essence of water (Strang 2009). Such waterscapes may involve

considerable human agency in the direction of water: for example through the construction of dams, reservoirs and irrigation channels, water pipes and taps. Or they may be low-key, producing only temporary fish weirs and small settlements around resource-rich wetlands. They may involve celebrating aesthetic or spiritual ideas about water, through fountains, fonts and sacred sites, or striving for population health through the provision of sanitation services. In whatever form, waterscapes are concerned with the ongoing materialization and perpetuation of particular cultural lifeways (Strang 2004). Deepening individual and collective understandings of how water is understood and valued, and the consequences of that valuation for how flows and cycles of water are used, is a crucial step in laying the foundations for sustainability.

Integrated Water Resources Management

In terms of the practicalities of resource management, the most common approach to water in recent decades has been integrated water resources management (IWRM). IWRM takes an ecosystem perspective of water together with its human uses; encourages broad stakeholder participation; and stresses that water, in all its competing uses, must be valued as an economic good. The overall goal is to manage water resources in ways that sustain the place and society in both immediate and long-term timeframes. This requires involving and addressing the views and concerns of diverse resource users; consciously recognizing the relationship between water development and the health and productivity of the economy, including varied agricultural, industrial, and energy uses of water; creating a sustainable drinking water supply and improving quality of water in rivers and other sources to ensure a healthy population; and recognizing the principal role of water for ecosystems and ensuring release of water to sustain and restore ecosystems and the biodiversity sustained by such systems. Practitioners have found IWRM a powerful tool to recognize and value ecosystem services associated with river systems and develop management strategies that accommodate human and environment needs, but its use has also generated considerable criticism over its failure to incorporate lesser-quantifiable values.

Environmental Flows, Cultural Flows

A core goal of IWRM is to balance human and ecosystem needs of water. To achieve this goal, the varied uses of water are identified and assigned an economic value, acknowledging the human need for water supply, recreation, and aesthetic values, as well as the role of the free flow of water in providing ecosystem services. The minimum flow required to sustain this basic human/ecosystemic integrity is called *environmental flows*.

A healthy flow of water will sustain human and environmental needs. However, flows for the environment and for cultural purposes are not one and the same. For

example, the connections held by Indigenous people to water, and to particular features or dimensions of the waterscape, may have been part of their existence for thousands of years, yet such values are not always reflected in environmental flow allocations. In Australia, this issue has generated the need for a new concept of *cultural flows* to further expand the IWRM model to manage water resources in a more holistic, equitable, and sustainable fashion. *Cultural flows* refers to the dynamic ways in which water sustains diverse cultural beliefs, values, and ways of life, as well as the ways in which groups value, care for, and sustain the health of aquatic systems. This approach involves not only managing flows to sustain ecological processes, but also ensuring that the water flows allocated to non-consumptive or environmental purposes are sufficient to recognize, respect, and sustain cultural ways of life.

The concept of *cultural flows* offers a way to further expand the IWRM model to manage water resources in a holistic, equitable, and sustainable fashion. How are we to do this? One strategy has been to document qualitative descriptions of the varied meanings that waterways have for people, and the knowledge and relationships that people have with these waterways. Such efforts produce a set of social and cultural indicators that are then used to structure and monitor management goals. A more complex strategy is to document the relationship between cultural values and *eco-system services*. Examining values in customary fisheries, for example, and the knowledge of them held by Indigenous people, provides a useful starting point in the quantification of indigenous values for water planning. Both strategies recognize that indigenous communities and other cultural groups whose long-standing ties to the land and customary ways of life constitute a *rights-holder* status.

Water Rights and Human Rights

Despite its overall adaptive potential, the cultural diversity described here is also vulnerable to erosion, particularly in situations where major power imbalances exist between local actors and those advocating particular kinds of development and/or structural change. Essays and case studies in this book argue that sustainability is achievable if collective laws, policies and actions:

- Encourage global recognition of the relationship between biodiversity and cultural diversity and the sustaining role of water resources;
- Acknowledge and nurture the varied roles played by cultural values, knowledge, and traditional resource management systems in protecting water quality, regulating access, and ensuring sustainable use of freshwater resources;
- Recognize and address the challenges that local communities confront as large-scale solutions to energy and water scarcity are proposed and implemented;
- Develop and implement the legal framework and social safeguard mechanisms to protect fundamental rights to water, livelihoods, and culturally diverse ways of life; and
- Work to incorporate cultural diversity into watershed management and water resource development.

International human rights law recognizes that all peoples have the right to self-determination and to the pursuit of economic, social and cultural development. While states have sovereign rights to protect, preserve and develop their resources in ways that benefit the nation as a whole, all of their citizens have the right to know about proposed development projects, such as dams, mines, logging and other large infrastructure projects, which may affect them in some way. All project-affected communities have the right to participate in project planning and decision-making processes; the right to just compensation for any damages and losses associated with development; and the right to benefit materially from such development. Indigenous communities have additional rights, recognised in the United Nations Declaration on the Rights of Indigenous Peoples (Article 32[2]). They have the right 'to give or withhold their *free, prior and informed consent* to actions that affect their lands, territories and natural resource'.

Claiming these rights is often difficult and contentious, especially when proposed developments involve significant upheaval and the loss of critical resources that sustain cultural diversity. Some states and their transnational development partners have laws and regulatory procedures designed to respect these rights and allow citizens to participate fully in development planning. However, in many instances, these rights are not recognized, respected, or implemented. Contributions to this book therefore argue that the right to free and prior informed consent not only reflects international law, but more importantly, offers an opportunity to protect biocultural diversity and manage water resources in a truly sustainable fashion. Claiming such rights requires:

- Timely access to information about the developers and the positive and negative effects on host communities and ecosystems;
- Discussion of the proposal within the affected communities;
- Consultation over the scope, scale, and terms with project developers;
- Access to legal assistance and independent advice;
- Decision-making processes to determine if consent will be given; and
- Should the project proceed, formal processes to implement the terms of any compensation, resettlement, and other benefits be negotiated by project-affected communities.

Structure

The book is divided into five parts. Although their themes, interests, and geographic locations intersect and overlap, each of the parts has a particular orientation.

Part I explores water's fundamental place in life, flowing through all organic processes, shaping all of the earth's environments, and coursing through humanity's traditions, values, meanings, politics, economics, art and engineering – i.e., culture in its broadest sense. The case studies and brief vignettes, conceptual essays and graphic imagery of this Part articulate the "culture of water" and the environmental consequences of human relationships with water; they speak to the breadth and

depth of cultural diversity in practices around water. Part I is a thick description of lived actualities and possibilities, with a central theme being the necessary foregrounding of cultural diversity in water policy.

Part II considers the “culture of water” through an explicit focus on traditional ecological knowledge and water resource management: approaches that have historically served to sustain the lifeways of indigenous groups and ethnic minorities. These contributions reflect the input of scientists, scholars, and advocates whose work with diverse cultural groups considers two key questions: how are traditional ways of life threatened by the degradation or loss of water resources, and, how might traditional knowledges contribute to future water security?

Part III examines current patterns of water resource management in various ecoregions and geopolitical contexts. It considers problematic contexts where water resource development and management have undermined the viability of culturally diverse groups (asking what are the lessons learned?), as well as cases where water resource management has achieved sustainable societal goals by strengthening biocultural viability (what best practices might be identified?). Case studies explore problems such as access to clean water and environmental health, and the role of culture and power in shaping, and addressing, vulnerability.

Noting current trends in global environmental change and state-sponsored efforts to ensure future water and energy security, **Part IV** considers the changing and possible future dynamics of intersections between water, biodiversity, and cultural diversity, with a critical focus on the lessons learned from the past several decades of hydrodevelopment. The rivers that run through mountain valleys and plains, and empty into major deltas sustain many of the world’s most biodiverse areas. These resource rich areas also support many of the world’s remaining indigenous nations, minority cultural groups, and place-based peoples. Hydroelectric energy and water resource development plans are shaped with an emphasis on project-specific proposals and funding, and on impact assessment frameworks that are place-specific, rarely allowing consideration of the cumulative effects such developments may have on regional or global patterns of biocultural diversity. Emerging trends include a massive increase in hydrodevelopment, with the associated displacements and ecosystemic changes posing a significant threat to the world’s remaining biocultural diversity. Thus this section asks ‘what lessons can be gleaned from past experience, and how might these transform understandings of the cumulative effect and synergistic forces at work in hydrodevelopment?’

Part V sketches out alternative scenarios for the future, arguing that a sustainable approach to water resource development must, first and foremost, be one that sustains the cultural and biological diversity of life. Contributions expand upon the case-study lessons with strategic recommendations for incorporating sociocultural perspectives into water resource management systems; and, with a more inclusive notion of sustainability, they address rights and entitlements to water for all human groups and all species, as well as reaffirming established stewardship principles and responsibilities.