

***Social Equity and Integrated
Water Resources Management***

By Humberto Peña

**Global Water Partnership
Technical Committee (TEC)**



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By Humberto Peña

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FOREWORD

Social equity is one of the stated goals of integrated water resources management (IWRM), along with economic efficiency and environmental sustainability. But what does social equity mean in the context of water management? And what are the factors that are needed to consider in pursuing this goal? Humberto Peña provides guidance on these questions in this important paper.

As Chile's National Director of Water Resources (1994–2006), Humberto wrestled with these issues in the development and reform of his country's national water policy. Among his principal responsibilities was to lead the application of the water legal system. He has been a member of GWP's Technical Committee since 2005 and has published more than 100 studies on water policies, hydrology and water resources. In addition to his own considerable expertise and that of his fellow Technical Committee Members, Humberto draws on insights from the fields of philosophy, economics, law, social psychology and system analysis to flesh out a concept that has until now, remained a vaguely stated ideal.

In *Social Equity and Integrated Water Resources Management*, he provides an analytical framework that policy makers and water professionals can use to bring greater clarity to the issue of social equity in their local context. The hope is that this paper will support better policy-making and encourage greater reflection and discussion on social equity in the water sector and beyond.

The paper explores the concepts that inform the debate on water and social equity and looks at equity in the context of processes, in particular the component of procedural justice in policy and water-related services.

One of the key messages of the paper is that social equity in water management is primarily about people, not water. Water may be allocated equitably, distributed equitably, and even accessed equitably, but if people are unable to derive benefits from it, the end result is not social equity. Thus it is not enough to consider only policies and processes within the water sector, but also the combined effect of these with other policies in other sectors and national development and economic policies. Ultimately, social equity should be judged by the final situation of people, and the distribution of the totality of benefits from water, both direct and indirect.

Humberto's analysis brings home the need for an integrated approach to water resources management – one that considers water management as a means to advance a society's equity goals and not an end in itself. Another important message from the paper is that although trade-offs are sometimes required between the goals of social equity and economic efficiency, well-designed policies that look at benefits and costs holistically rather than in piecemeal sectors, can often advance both goals.

So I would like to offer a special thanks to Humberto Peña and the other members of the GWP Technical Committee for furthering our understanding of this complex subject.

Dr Mohamed AIT KADI
Chair, GWP Technical Committee

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1. INTRODUCTION

Social equity constitutes one of the three pillars of Integrated Water Resources Management (IWRM) – along with economic efficiency and environmental sustainability – and is normally among the stated goals of public water policies. It features frequently in the arguments of those who promote reforms within the water sector and of those who object to reforms. However, despite recurrent references to social equity in the rhetoric of water resources development and management, it usually remains a vaguely stated concept with little or no effort made to clarify its scope and contents. Academic and political documents and reports, including those produced for major international fora, demonstrate this same imprecision when it comes to the subject.

Thus, as a way of giving a concrete sense to the goal of social equity, as well as encouraging greater consensus within water policy debate, this paper fleshes out the concept in the context of water. The issue of equity has many dimensions. Different fields – such as philosophy, economics, law, social psychology and systems analysis – have something to say about equity and all have different ways of defining the concept. This paper draws on these insights as well as on practical experience in developing and implementing water policy. The purpose of this paper is to help those engaged in the business of water policy by providing an analytical framework that will clarify the relationship between water and social equity in the local reality. It does not promote particular policies or specific solutions to equity problems, since, ultimately, both the identification of problems and their solutions depend on the context. The case of transboundary river basins and aquifers, when benefits are shared between geographical spaces that do not have common jurisdiction, is not treated in this paper.

The paper begins with the general context and the concepts that inform the debate on water and social equity (Chapters 2 and 3). In Chapter 4 we analyse the issue of equity in water-related decision-making processes, in particular the component of procedural justice. Then, we examine equity in the contexts of management of water as a resource (Chapter 5) and water-related services (Chapter 6) – with the understanding that both aspects must be addressed to achieve social equity. The paper closes with the main conclusions of this analysis.

2. GENERAL FRAMEWORK

2.1 Social equity in IWRM: A task for society as a whole, not just the water sector

Over the last several decades, social equity has constituted a development goal that is increasingly a subject of strong concern in modern societies. Consequently, it is a goal that is always mentioned in international conferences and in the context of the United Nations. For example, it can be seen in:

- the shaping of the Millennium Development Goals (MDGs);¹
- the Human Development Report, prepared annually by UNDP to document progress shown by countries in overcoming inequitable conditions – conditions which prevent the development of human potential in much of the human population; and
- the human rights approach, which seeks the promotion of higher standards of human development for all, and which is becoming increasingly common in public policy proposals, including in the water sector.²

The search for social equity in specific sectors such as the water sector, must be understood in the context of equity for society as a whole. This means that the goal of social equity in water management is aimed at people in all their dimensions and not just as water users. In other words, water's significance for equity in society should be assessed considering all of the ways in which it impacts the welfare of people and the development of their full potential as human beings, be it directly or indirectly. This consideration is especially important for the water sector given the multiplicity of ways in which water-related activities affect natural and human systems.

This holistic approach to equity is consistent with the IWRM approach, which promotes tackling each water management challenge in the context of its intimate relationship with how the rest of the social structure functions.

¹ GWP/TEC (2003). *Poverty Reduction and IWRM*. TEC Background Paper No. 8.

² United Nations Resolution 64/292 of 28 July 2010, adopted by the UN General Assembly, recognized the right to safe and clean drinking water and sanitation as a human right.

As the determinants as well as the outcomes of social equity extend well beyond the water sector, we must consider not only the sector's policies and institutions but also general policies and institutions that are related to – or influence – water management. From this perspective, it is of interest to point out that water-related activities take place in three institutional and management spaces that, though different, are related (see Figure 1).

- i. Activities that take place in the specific institutional scope of water management and that generate benefits that are relatively independent from other sectors. For example, programmes to improve rural drinking water systems, which produce direct benefits in the health of the population, are initiatives that do not necessarily require actions that are outside the scope of the water sector, to impact on the welfare of people. Thus, the social equity aspect of such initiatives is determined largely within the sector.
- ii. Activities whose results depend on institutional systems, policies, plans and programmes outside of the water sector, but which are still directly related to water resources. In these activities, the benefits depend upon other productive factors – the critical difference between this category and the one above. Thus, the equity of the water-related outcomes may depend upon policies that extend beyond the water sector. This is the case, for instance, in irrigation projects, which are part of agricultural policies. External factors that affect water resource management will also influence the social equity of the outcomes, i.e. determining who are the beneficiaries of a range of such actions, such as capital availability, access to markets, technological capacity, macroeconomic policies, and so forth. This category of activities is more removed from the first, and thus demands a more complex framework within which to consider social equity.
- iii. General social and economic frameworks that constitute the environment of the water sector and that impact water management as well as the magnitude and distribution of its benefits. This category moves the analysis to a broader context and includes consideration of a range of higher-level objectives that national governments seek to achieve for their societies in general – e.g. a State's poverty alleviation strategies, policies on corruption, programmes on education, and support for an effective justice system. These national goals and how they are pursued will have an impact on water resources management and will affect social equity outcomes. Thus we must also consider this broader context when analysing equity.

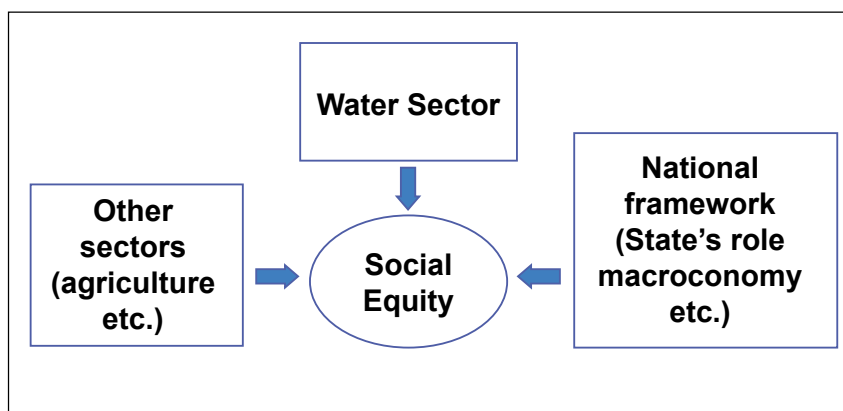


Figure 1. Policy areas that influence social equity outcomes from water management

This means that there would be no way to conceive equity in the scope of water management if it were delinked from the group of conditions that make a particular society more or less equitable. In this way, social equity in the scope of water institutions is not sufficient to guarantee socially equitable results. It would be unrealistic to think that equity in water resources management will resolve equity situations that have their roots in different aspects and levels of society. In other words, equity levels will be conditioned by the levels and goals of equity that are generally dominant in society and of which the water sector is only a part.

This paper postulates that a realistic equity goal in the water sector should be for water management not to constitute a barrier to equity, much to the contrary; it should be a stimulus and contribute toward advancing equity in society as a whole. In this sense, within this paper water management is understood as a means to reach greater social equity, and when we speak of equity in water management, we are talking about a form of management that contributes to the larger equity goals of a society. In this way for example, even though injustice and poverty problems seen in the rural areas of many countries cannot be solved through water-related policies, water management should avoid contributing to those problems. And appropriate management of water resources can and should be one of the tools for addressing multiple dimensions of poverty, as we see in various documents related to the achievement of the Millennium Development Goals.³

³ GWP/TEC (2006). *How IWRM will contribute to achieving the MDGs*. Policy Brief No. 4.

2.2 Water resource systems: Benefits and Beneficiaries

To achieve social equity in water management requires, among other factors, the recognizing through the institutional system, of the benefits and/or costs associated with it, and the people or groups that may benefit and/or be negatively affected by such management.

This question of benefits – which in other sectors may have a simple answer – is extremely hard to answer in the particular case of water resource systems, at least if what is expected is a relatively precise quantitative answer. This difficulty finds its origins in the numerous roles that water plays in human activities and in nature, as well as in the different ways in which water manifests in nature and the complex relations between the different components of water systems.

As it is known, water – as part of the natural physical medium – constitutes the main support for the biota and is fundamental for the development of all life as well as human activities. Water resources provide society with particularly numerous goods and services, such as water supplies for drinking, irrigation, mining, livestock, industries and other uses for which it is extracted directly from aquifers and various natural water bodies. Also, water resources provide many environmental services that support biodiversity and ecosystems, as well as benefiting humans through the use of environmental resources such as fishing or enjoyment of beautiful scenery where water is a fundamental element in the landscape.

In addition to the wide-ranging benefits associated with water resources, there is also serious damage to populations and their infrastructure associated with our inability to predict and control water flows, as in the case of floods or droughts.

In our efforts to benefit from water resources we alter the natural environment, and thus generate effects that are sometimes not evident and are generally hard to quantify. For example, a dam built with the purpose of improving the water supply for different users may interfere with fishing, the stream's sedimentary balance, and the touristic value of certain areas, among other impacts; or allowing for irrigation in an area, which would generate direct productive benefits for farmers, could simultaneously contribute to raising water tables thus swamping low lying areas, soil salinization, aquifer pollution, soil erosion and other negative impacts.

Water acquires value through the benefits it gives us, be it in the form of products or services, or in terms of symbolic or cultural values. Water's inherent value has been subject to analyses from an ample economic perspective that takes into account benefits not reflected in the marketplace. All benefits are included in the concept of Total Economic Value of Water, which makes this concept of interest as one possible approach to the analysis of social equity.

The Total Economic Value^{4, 5} generally encompasses multiple values.

- Direct use value, which is derived from direct use of water to satisfy a need or obtain a benefit – be it economic or social. This type of use may or may not be consumptive depending on how the water resource is used. It is consumptive if the water is transformed, e.g. through drinking, crop evapotranspiration, incorporation into industrial products, so that it cannot be immediately reused. The use is considered non-consumptive if the water is still available for other uses, e.g. hydroelectric generation, transportation, and fisheries.
- Indirect use value, which corresponds to net benefits derived beyond those from direct use; for example water that sustains ecosystems, which in turn provide benefits to some people or groups.
- Use value given by social goals, which seeks to reflect the contribution of water to reaching defined social objectives. An example of this could be achieving the MDGs, food security, biodiversity protection, etc.
- Optional use value, which reflects the interests of those who do not wish to use the resource currently, but nevertheless value the fact of saving the resource for future use. This value is recognized, for example, in the reserving of water rights for future projects or needs.
- Non-use value, which considers the value that the simple fact of water resources existing represents for some people, be it currently (existence value) or for future generations (legacy value). It considers that the disappearance of water would constitute loss of welfare. In this category we find the symbolic value that can be given to water in some societies in which it is part of cultural heritage or religious identity. In this case, the value assigned to water is intrinsic and of a superior order, and not as a simple commodity.

⁴ GWP/TAC (2000). *Integrated water resources management*. TAC Background Paper No. 4.

⁵ K. Janusz (1998). *Economic value of water*. In: *Water: a Looming Crisis? Proceedings of the International Conference on World Water Resources at the Beginning of the 21st Century*. IHP-UNESCO.

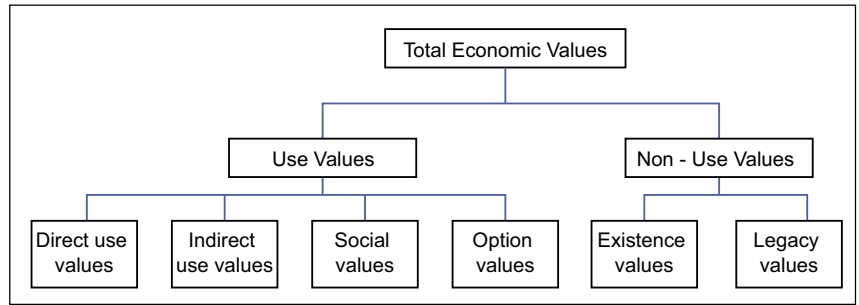


Figure 2. Typology of values

Figure 2 presents the typology of values described above.

Access to benefits is another important aspect of social equity in water resource management. In this sense, it is useful to distinguish between public and private goods and common-pool resources.⁶

Public goods have, from an economic point of view, two main features: non-exclusion (any person may access the good and anyone who does not pay for the service or good is not excluded), and non-rivalry in consumption (which means that one person's use of the good does not affect the others' chances for use of the same good). Goods that have these features may be: the recreational use of a river, protection services against floods, or the extraction of water from a river or aquifer in its initial stages when demand is far lower than availability and it has not been necessary to establish access restrictions. Private goods on the other hand are not free access, and also present consumption rivalry.

In reality, public goods that do not present rivalry are rare; as is the case with common-pool resources. In water resources management, mixed goods that lead to rivalry but that are also common goods (of which the entire community can claim ownership) are frequent. These goods may occasionally have a restricted access regime via certain rules, so as to maintain balance between use and availability and to guarantee the sustainability of the exploitation in the long term. Or goods may fall under a free-access system, but in such cases exploitation levels may eventually be high enough for there to be consumption rivalry, as, for example, in free extraction of groundwater from an overexploited aquifer system.

⁶ E. Ostrom (2009). *Beyond Markets and States: Polycentric Governance of Complex Economic Systems Prize Lecture*, December 8, 2009. In Workshop in Political Theory and Policy Analysis, Indiana University, Bloomington, IN 47408, and Center for the Study of Institutional Diversity, Arizona State University, Tempe, AZ, U.S.A.

Another type of goods that is of great importance regarding water management is the so-called merit good – goods society considers should be received by people under any circumstances, regardless of willingness to pay. In many societies, basic access to water and sanitation fall into this category.

If one wishes to identify the beneficiaries of a water resource system, and, using this information, to analyse its implications for the subject of social equity, it is not sufficient to consider the players that are directly related to water – those who are using it in their productive activities, enjoying it in diverse ways or receiving the impact of externalities related to its management – since the human system that manages and benefits, directly or indirectly, from water resources, is complex. The benefits of water management are transmitted far beyond the scope of direct water users through sophisticated economic mechanisms, which are often difficult to identify, such as commerce, public investment, taxes, subsidies, etc. In the end, the issue of social equity is not only about the distribution of benefits among abstract entities or among different user sectors, it is also about the final welfare derived from water by people in society. In this sense, it becomes necessary to recognize the role of economic flows including the following.

- Taxes or other contributions to both central and local governments that are paid for by productive activities associated with water. The degree to which these charges redistribute the benefits of production depends on the final destination of the money and the State's management effectiveness.
- Impacts from production of goods and services associated with water that contribute to galvanizing the economy through productive chains with other economic areas and the contribution to family incomes and employment.
- Impacts of activities related to water management in advancing social goals, such as combating poverty, enhancing food security, reducing rural to urban migration, etc.

In this way, the range of people who benefit from activities associated with water management and who receive assorted benefits becomes considerably wider, and in most cases includes society as a whole.

By considering the transfer of benefits through the economic system, we can identify a vast range of possible beneficiaries of water resource systems. These can be divided into several key categories:

- i. **Groups or people who benefit directly** from the use of the water resource, who may access it in a private manner through concessions by a public authority or through market mechanisms. In this category we commonly see irrigation water users, the people who have access to drinking water and sanitation, companies that generate hydroelectric energy and those involved in mining and industrial activities that use water resources, and many others.
- ii. **Groups or people that benefit from or are damaged by the impacts of externalities** in water resource management. This is the case, for example, of users of return flows generated from irrigation, or people impacted by pollution from untreated sewage.
- iii. **Sectors or people that benefit from public goods**, which are of universal access. These goods or services may be quite varied, such as the enjoyment of water for recreation, protection against floods, conservation of ecosystems and the environment, and the use of fluvial systems for transportation, and other benefits even more diffuse, such as the benefits of living in a society with less poverty, the enjoyment of the intrinsic value of water associated with a symbolic meaning, etc. In any case, just because goods and services can be universally accessed does not mean that they are equally valued by all groups, since their use may be conditioned by objective causes, such as economic limitations that could prevent some sectors from effectively using them, or subjective preferences.
- iv. **People or groups that benefit from State actions or services that are funded by resources obtained from water-related economic activity.** These sectors may be local or national, depending on the features of the country's political-administrative system as well as on the nature of the financial resources that are generated. For example, in States where provinces or regions are given a certain degree of sovereignty, the redistributive action of the State may be limited to this scope. In the same way, there may be taxes that are meant to benefit local areas, for example, where legislation demands that resources must be partially reinvested in the basin where they were generated. On the other hand, beneficiaries of these types of activities and programmes may have no direct connection with the basin from which the original resources were derived. Also in this category are the beneficiaries of merit goods given directly by the State, such as free basic drinking water and sanitation.

How we understand the importance of these State-provided goods and services depends on the equity criteria that prevail in each society, and especially on the role that the State plays in ensuring equity and the State’s suitability to the task.

- v. **People or groups that benefit indirectly from the use of water resources**, because of their participation in the productive process utilizing those resources or because of the impact water use has on other economic activities. This is the case of benefits related to job creation, remuneration payment, or productive chains with other sectors.

Each social group or person may benefit in different ways in each of these five categories. For example, a local population may simultaneously benefit from the water resource system by obtaining water for drinking and for productive activities; by enjoying the recreational opportunities offered by natural streams; through the galvanizing effect water has on an area’s commercial activity and through State programmes funded by water-related taxes, some of which may benefit groups outside the basin.

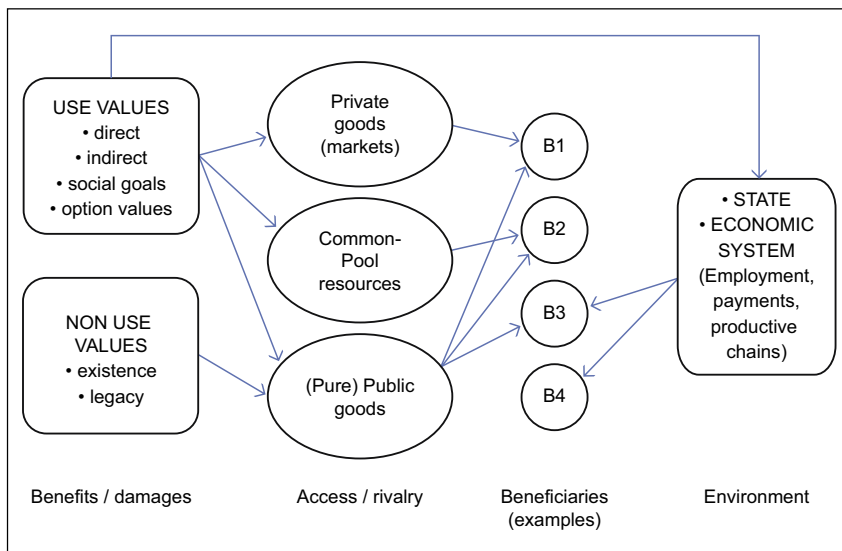


Figure 3. Benefit flows in water resources systems

Figure 3 presents a simplified representation of the benefit flows of the water resource system – including the different types of benefits and forms of access.

As the figure above shows, the determination of benefits and beneficiaries of a water resource system necessarily requires a holistic focus – one capable of identifying the interactions and externalities, in both natural and human

Box 1: Beneficiaries and benefits in the lower Mekong Basin

The Lower Mekong Basin (LMB) with its approximately 60 million inhabitants depends economically and socially to a large degree on the Mekong river resources, and has a large development potential. The diverse benefits from the river are rather different in their direct and indirect impacts on individuals and society at large. There is also a considerable variation between the four member countries: Cambodia, Lao PDR, Thailand, and Viet Nam. In addition, China and Myanmar, also Mekong riparian countries, are not members of the Mekong River Commission (MRC) but are considered dialogue partners and share information.

The main benefits and their impacts on target groups can be summarized as follows.

1. **Fisheries:** The annual catch of around two million tonnes of fish contributes significantly to protein consumption of the population. In Cambodia, 92% of animal protein consumed is sourced from aquatic animals, 72% is from fish. Poorer groups have a higher dependence on fish than the wealthier groups. The situation is similar in (rural) Lao PDR, but less pronounced albeit still significant in Thailand and Viet Nam. Fishery benefits from the river and rice fields are predominantly local and individual; private aquaculture is mainly for regional consumption and export. Therefore, all initiatives fostering traditional fisheries are of immediate benefit to the local (poorer) population and hence improve equity.
2. **Hydropower:** The huge commercially and technically viable hydropower potential of ca 30,000 MW in the LMB is currently only exploited to a small extent (11 schemes with a total of 1,600 MW). All existing plants are on the tributaries, none on the main stream. By far the largest potential is located in Lao PDR where also the majority of existing plants operate. In Lao PDR the bulk of the generated power is exported and constitutes the largest foreign currency income source for the country. However, a large number of dams on tributaries (around 35 plants) and on the main stream (12 plants, in addition to six plants further upstream in China) are presently under discussion. Benefits from hydropower are predominantly regional (LMB) and beyond, namely for export to Thailand and Viet Nam and out of the region.
3. **Agriculture:** Agriculture is the main source of livelihoods within the basin, accounting for 70–80% of employment for the LMB's largely rural population. Most of the agriculture is rainfed or pump irrigated from the rivers or from groundwater. Only in semi-arid areas of Thailand are there significant amounts of reservoir-fed irrigation. In the Mekong delta in Viet Nam, agriculture depends to a large extent on the fresh water released from the Tonle Sap Lake, which acts as a natural reservoir. Benefits from agriculture are predominantly local and regional, with exception of the rice production in the delta, which also serves areas outside the LMB and for export.
4. **Navigation:** Historically, navigation played a major role in accessing the area. However continuous navigation from the mouth to the upstream areas is interrupted by large waterfalls, such as the Khone falls on the border of Cambodia and Lao PDR. Hence, navigation is divided in two independent stretches: the downstream stretch from the South China Sea to the Khone Falls with ships up to 10,000 dwt plying up to Phnom Penh, and the upstream stretch with small ships of around 10–20 dwt. Benefits from navigation are local and regional on the upstream stretch and local to national on the downstream stretch.

Box 1: Beneficiaries and benefits in the lower Mekong Basin

As with the benefits described above, the potential negative development impacts remain mainly local for all sectors, with the exception of hydropower, in particular hydropower potential on the main stream. Further, issues of equity will generally be more important the larger the impact area. Therefore, it is essential to check the main stream hydropower development in relation to its impact on equity. More often than not, the beneficiaries are not the same as those who suffer the negative impacts from such developments. A Strategic Environmental Assessment (SEA) was recently carried out for the 12 main stream power plants. It utilized several social indicators for specific issues without having a dedicated 'equity indicator', and the assessors came to the conclusion that the implementation of the main stream dams would:

- likely result in substantial economic growth, locally through the construction activities and nationally through the power export in Cambodia and Lao PDR, the countries where the projects would be located;
- improve navigation conditions for larger vessels; but
- have significant net negative impacts on the fisheries and agriculture sectors that can only partly be mitigated;
- contribute to a growing inequality in the LMB countries because benefits would accrue to electricity consumers using national grids (even outside of the LMB) whereas costs would be borne by poor and vulnerable riparian communities; and
- in the short to medium term, increase poverty among the poor rural and urban riparian areas.

The SEA concludes by recommending that decisions on mainstream dams be deferred for a period of ten years with reviews every three years to ensure that essential deferment-period activities are being conducted efficiently – in particular to improve the bottom line on equity and equality.

Author: Hartmut Bruehl

environments, that decisively affect the magnitude and destination of indirect system benefits and other types of benefits. Frequently, direct benefits and beneficiaries reflect only a small part of the real results of water management, and it is only by mapping the flow of indirect benefits that we see the true picture.

In this way, when we speak of social equity in the distribution of beneficiaries associated with a water resource system, we speak of equity in this universe of benefits and beneficiaries. However, because of practical limitations, it is often necessary to focus on direct beneficiaries. The danger of such a limited analysis is that the true value of the system is under-appreciated.

3. THE ISSUE OF SOCIAL EQUITY AND WATER MANAGEMENT: A CONCEPTUAL APPROACH

3.1 Equity criteria in water management



conomic efficiency, environmental sustainability, and social equity are the three goals of the IWRM approach.⁷ IWRM's social equity goal has been presented as follows: 'to ensure equitable access to water, and to the benefits from water use, between women and men, rich people and poor, across different social and economic groups both within and across countries, which involves issues of entitlement, access and control'.⁸ However, when is access to water and its benefits to be considered equitable? This question is complicated by the wide spectrum of benefits associated with water resources and the complex interactions that determine who benefits and how.

Other critical questions are: What does social equity mean at the level of a whole society? How is the situation of equity within the water institutional system related to equity in the society? Is access to water relevant for equity at this level? Or rather is it only the benefits of access that are important? Can we identify criteria for equitable water management? Considering the diverse nature of benefits, how can they be compared from the perspective of equitable distribution? Is the goal of social equity that is proposed for water management concurrent with the human rights-based approach to development? The fields of philosophy, economics, sociology, law, systems engineering, and social psychology, all have contributions to make towards answering these questions. And because this paper is directed at the practical application of the equity concept in public policy and not at the specialized analysis of particular aspects of equity as a subject, we have synthesized contributions made by different viewpoints and fields in the following analysis.

Justice has always been a popular topic for reflection in the social sciences, particularly in the last 200 years – from the utilitarian proposals associated with classic economy in the 18th and 19th centuries through the theories of justice and welfare proposed in the past few decades.

⁷ GWP/TAC (2000). *Integrated water resources management*. TAC Background Paper No. 4.

⁸R. Lenton and M. Muller (eds.) (2009). *Integrated Water Resources Management in Practice. Better Water Management for Development*. GWP/Earthscan.

Among these theories, the utilitarian view and the recent contributions of Rawls and Sen^{9,10} are of particular interest for our understanding of equity. Utilitarianism postulates the existence of a utility function that reflects each individual's level of satisfaction. According to the traditional utilitarian position, society should pursue the maximization of the sum of individual utilities. In its pure version, this approach is indifferent to the distribution of utilities among members of society, though in other versions, individual utility functions are aggregated differently, following some normative criterion, which may favour a more egalitarian distribution. According to classical economic analysis, this viewpoint, oriented to the maximization of individual utilities, would drive us to a point of economic efficiency. Rawls objects to the idea that social welfare depends directly and solely on individuals' levels of satisfaction or dissatisfaction. In particular, he objects to the possibility of comparing and aggregating individual utilities, the lack of attention to distribution of benefits within society, and the reduction of the concept of ethical judgment to utility.

Rawls's criticism of utilitarianism leads him to propose an idea of justice that is based on an agreement held by rational individuals, who are ignorant of their position within society (the "veil of ignorance"), so there would be no distortion regarding each individual's personal interests. This way, for Rawls, "the question of equity comes up when free people who lack authority over each other embark on a joint activity and establish or recognize among each other the rules that define this activity and which determine the respective shares in benefits and liabilities. A practice will seem to be equitable to all parties if none of them feel that, in participating in it, he or some other party is profiting, or being forced to give into claims that he considers illegitimate". According to this perception, a practice would be fair or equitable when it satisfies the principles recognized by the those taking part.

Rawls proposes that there will be agreement on the following two principles.

- i. Each person has an equal right to certain basic freedoms.
- ii. Social and economic inequalities may be justified only if they respond to positions that are open to all, in conditions of equal opportunities, and if this is to the benefit of less advantaged sectors (this approach is

⁹ J. Rawls (2001). *Justice as Fairness*. Harvard University Press.

¹⁰ A. Sen (1979). *Equality of What? The Tanner Lecture on Human Values*, delivered at Stanford University.

known as Principle of Difference¹¹). The variable to be considered when defining equity, according to Rawls, is an indicator of primary goods that includes goods such as freedom, opportunities, income and wealth and the bases of self-respect.

Thus, the Principle of Difference generally leads to a total benefit below the optimal conditions that a classic utilitarian approach would deliver, since redistribution processes alter the structure of incentives with which the perfect market operates, and thus are not neutral in terms of efficacy. Nevertheless, its total benefit is greater than that of an egalitarian distribution, since it accepts inequity when there are shared benefits and it justifies loss of efficiency only if it results in benefits for the weakest sectors.

Sen focuses his attention on the link between goods held by one party and the final satisfaction or utility that is generated by consumption of the goods, emphasizing the role played by each person's capacities. These capacities constitute an important part of the person's real individual.

Sen focuses his attention on the link between goods held by one party and the final satisfaction or utility that is generated by consumption of the goods, emphasizing the role played by each person's capacities. These capacities constitute an important part of the person's real individual freedom, and depend on personal features and social factors. Accordingly, he proposes that equity in society should guarantee certain real freedoms, so that the individual has a possibility to achieve his or her development.¹²

Social psychology offers a different approach to the subject of equity. Instead of analysing the most desirable model of distribution, it investigates how different social groups perceive equitability or fairness.

According to the literature, the perception of equity is associated with two factors: 'proportionality' – that the distribution of goods recognizes the effort each has put into the results – and 'equality' – that all parties are treated in the same manner. The relative importance of these two factors depends on the subject and on each person.

¹¹ The Principle of Difference corresponds to a Leximin-type distribution criterion, which consists in organizing the states of economy, maximizing the worst situated individual's welfare, and in case there are various states that fulfil this condition, according with the second-worst situated individual, and so forth.

¹² A. Sen (1979). *Equality of what? The Tanner Lecture on Human Values*, delivered at Stanford University.

In relation to water allocation, research found that social groups may attach importance to equity in decision-making processes, or procedural justice, that goes beyond the concrete outcomes of those processes, or distributive justice.^{13,14} The perception of equity in decision-making is determined by: the possibility of participating and expressing one's opinion, the impartiality and credibility of the authorities that are to decide, appropriate information, the capability of responding to any subject that is raised, and being treated with respect. In addition, social psychology research shows that social partakers do not act exclusively from self-interest, as is usually believed, but are also driven by social motivations.

Regarding the criteria applied to public policy over the allocation of goods on behalf of the State, two different paradigms of distributive justice are frequently encountered, especially in developing countries. The first one advocates for an egalitarian distribution and responds to rights ethics, under which all people are understood as equals deserving of equal treatment. The second one responds to equity ethics, and recognizes that individuals are different from each other and that to reduce inequalities, they must receive differentiated treatment.

The egalitarian model results in public policies that are universal, since they are applied equally to all individuals. The equity model, on the other hand, advocates for a selective orientation that focuses on helping those most in need, to raise their possibilities to the level of the rest of the population.

As we have seen, in the search for criteria to define equitable water management, many different fields – from economics to social psychology – have something to add. And when it comes to crafting public policies and institutions, their combined insights and perspectives are much more useful than the narrow lens provided by any one field or theory.

In water management, we can distinguish many particular areas in which different types of equity are seen, and it is therefore possible to accept different specific criteria in each case.¹⁵

¹³ G.J. Syme, B.E. Nancarrow and J.A. McCreddin (1999). "Defining the components of fairness in the allocation of water to environmental and human uses". *Journal of Environmental Management* 57:51–70.

¹⁴ C. Gross (2008). "A measure of fairness: an investigative framework to explore perceptions of fairness and justice in a real-life social conflict". *Human Ecology Review* 15 (2).

¹⁵ K. Wegerich (2007). "A critical review of the concept of equity to support water allocation at various scales in the Amu Darya basin". *Irrigation and Drainage Systems* 21:185–195.

Finally, we must bear in mind that the equity criteria that is applicable in each case depends significantly on cultural, social, economic and political conditions of each country or region.

Taking all this into account, this paper proposes six general principles that may constitute a conceptual framework for equity in water management.

- a) **Social equity refers to the needs and rights of people:** Social equity does not focus on things (e.g. water endowments or number of hectares irrigated), but on satisfying the needs and rights of people. In the case of water management, the subjective dimension is strong because of the implications water has for people's survival, and for their way of life in general; because of the different preferences each person may have regarding water's use; and because of the different possibilities users have of obtaining benefits from the water resource, depending on their capabilities. This means that in a developing water resource project, the existence of certain basic needs of people must be recognized, as well as the different capabilities of people to benefit from water, and the different values that people attach to goods or services associated with water. For example, some people may value water's role in scenic beauty or recreation opportunities over productive uses.

Putting people as the centre of concern means that water management must be understood as a way to advancing social equity goals. Thus, the analysis of water management considered in an isolated manner is not always enough to assess its performance. Water management will be understood to be equitable when it contributes to making the situation of persons within society more equitable.

Also, this emphasis on the final situation of people means public policies must be assessed as a whole. Thus, it will be necessary to consider the cumulative effect of water resource management policies, as well as water-related services and policies outside the sector, including general policies that may determine the final impacts on social equity.

- b) **The totality of benefits must be considered:** As previously discussed, the benefits derived from water are of different types and each person or group may access them in different ways. Thus, when analysing the equity of a situation, the totality of generated benefits or damages for different partakers must be considered – including indirect benefits and

environmental and other externalities. On the other hand, the different nature of goods and services that are associated with water management, as well as the different values assigned to them by beneficiaries, makes it highly complex to define exactly what is to be shared equitably. In a water resource system there are usually some goods that are subject to market value, some that are not but that can still be valued from an economic viewpoint, and others that are completely resistant to economic valuation. Also, it is frequently the case that the value assigned to benefits and costs is related to attributes that are difficult to measure. For example, in a water resource system, people can simultaneously derive a variety of benefits and damages from: greater security in the supply of different demands, water quality changes, changes in groundwater levels, the development possibilities for poorer sectors, flood risks, changes in scenic conditions and possibilities for recreation, alterations in ecosystems, and many others. This diversity in goods and services makes it difficult, if not impossible, to come up with a common metric to assess the equity of a particular management alternative. Notwithstanding the difficulties, to assess the social equity of a particular policy or institutional system, all of the associated benefits and costs must be considered. This must also include consideration of impacts on the integrity of the water resource, which must be protected.

- c) **Equal opportunities, maintaining fair play and procedural justice in general, are fundamental components of social equity:** In the water sector, this means attention to the ‘soft’ aspects of water management, such as mechanisms for participation and conflict resolution, capacity building for water users, and agreement on the rules that determine what is fair play. Thus, not only must ideals to achieve social equity be declared and agreed, they must also be enforceable, and law plays an important role in this respect – in ensuring both the substantive and procedural parameters for realising equity in practice.
- d) **The needs and ethical principles that are recognized as basic by society must be prioritized:** There are certain principles that have been put forward by societies, for example non-discrimination, access to certain basic needs. In general those demands have been included within the concept of human rights and are indispensable to creating an equitable situation.

- e) **The present situation of equity must be analysed within the framework of the historical processes that led to it and its current dynamics:** The current distribution of benefits that come from water in a particular society is determined by numerous cultural, economical, social and political factors that have influenced its historical development. It is possible for the same original principles to maintain their validity over time from the perspective of equity, giving social legitimacy to the existing distribution of benefits. Or it may be necessary to change them totally or partially as the predominant values evolve or new challenges emerge as a result of growth.
- f) **Although water policies are often able to advance economic efficiency and social equity goals simultaneously (see section 5.2), in some cases achieving social equity may require trade-offs with economic efficiency:** The total volume of benefits is affected by the distribution that is adopted. As has been pointed out, a completely egalitarian distribution of benefits does not maximize the total amount of benefit derived, since it distorts or eliminates certain incentives. In this context, we must ask ourselves what level of inequalities should be accepted.

As has also been pointed out, the level of social equity incorporated into the institutional system and water policies depends on each society and the ethical values it holds at that point in its development. So the approaches adopted by different societies can range from Rawls's Principle of Difference, according to which only those inequalities that imply benefit for the most vulnerable sectors are accepted, to the classic utilitarian proposal that seeks only a maximization of benefits, regardless of their distribution or social equity.

Also, it is important to keep in mind, as was pointed out in point (a) above (Social equity refers to the needs and rights of people), that in the analysis of benefits, we must consider several factors. These include the cumulative effect of water resource management policies, as well as those policies that are involved with water-related services and State sector and general policies, including the redistribution instruments implemented by societies to compensate the poor – such as taxing and subsidizing systems.

Figure 4 depicts how different combinations of water allocation policies, water services policies and general policies yield outcomes with different

relative levels of social equity and economic efficiency. In it, we see two different policy trajectories. Trajectory OA shows the result of water sector policies that are oriented toward an equitable original allocation combined with other policies that strive towards economic efficiency; such would be the case with policies that support poor farmers to improve their agricultural productivity. In trajectory OB, we see the results of activities that attempt to generate greater equity in the distribution of benefits by applying general redistributive policies (for example, through taxing) to highly efficient activities from the point of view of water economy (for example, hydroelectric generation or mining activities).

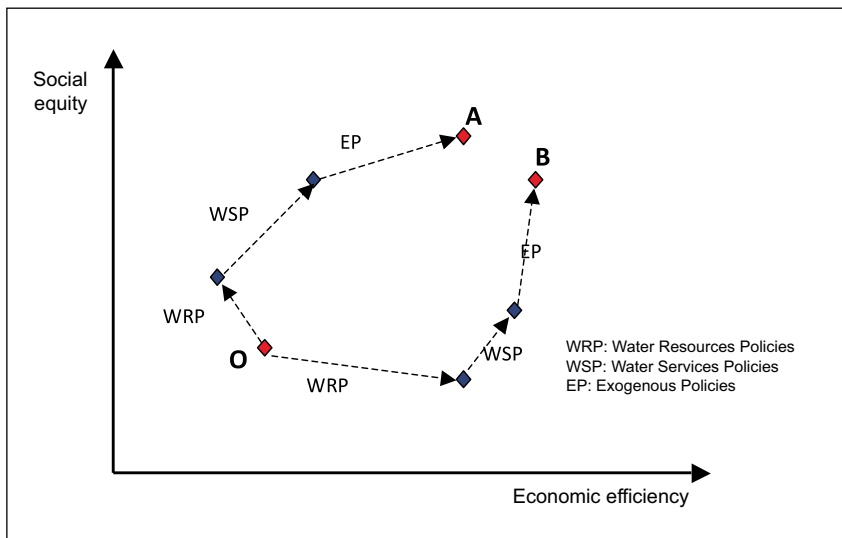


Figure 4. The combined effects of different policies on equity and efficiency outcomes

In the diagram, point O represents the initial situation. The arrows to the second points illustrate relative equity-economic efficiency outcomes from two different approaches to the allocation process. The third points show the situation that results from the addition of water services policies, and finally the fourth points show the final situation, once the effects of general policies have been considered. Consistent with the foregoing analysis, this final situation should be within a space between utilitarian criteria and Rawls's difference principle.

3.2 Equity and human rights

The equitable distribution of benefits associated with water implies priority for a group of basic needs and a minimum standard of water service to

meet those needs. A society must agree on the needs to be prioritized and the standards, and a distribution that does not provide the aforementioned minimum standard cannot be considered equitable.

Of the basic water needs there are some that are included in the concept of human rights. Regarding this subject, the High Commissioner of the United Nations for Human Rights has defined the ‘Human Rights-Based Approach’ – a conceptual framework for the process of human development that is normatively based on international human rights standards and operationally directed to the promoting and protecting human rights. Essentially, this approach integrated the standard norms and the principles from the international human rights system into the plans, policies and processes of development.

A main feature of this approach is that the minimum requirements defined as human rights are not optional and are not a voluntary legal disposition adopted or abandoned depending on the humour of each government. Thus, this approach establishes a relationship between the applicants, who are considered legal holders of rights, and the state or other players, who have correlative obligations and who are considered responsible for the obligation of tending to those requirements.

Regarding water, the General Comment 15 of the Committee for Economic, Social and Cultural Rights of the Economic and Social Council of the United Nations established the human right to “water in an amount that is sufficient, safe, acceptable and accessible physically and economically, for personal and domestic use”¹⁶. As with other rights, the fulfilment of these rights is a responsibility of the States under the principle of ‘progressive fulfilment’. This was further elaborated in the recently adopted UN Resolution on the Human Right to Water and Sanitation.¹⁷ The UN Resolution declares “the right to safe and clean drinking water and sanitation as a human right that is essential for the full enjoyment of life and all human rights.”

We must also consider rights more broadly connected to water resources management, such as those related to health, the home, food, life and dignity that are also implicitly related to water. The right to a healthy

¹⁶ Committee on Economic, Social and Cultural Rights. General Comment No.15 (2002). The right to water (arts. 11 and 12 of the International Covenant on Economic, Social and Cultural Rights). Twenty-ninth session. Geneva, 11-29 November 2002

¹⁷ UN Resolution A/RES/64/292. Resolution adopted by the General Assembly 64/292. The human right to water and sanitation. Sixty-fourth session. 3 August 2010

environment or to the environment itself is another right with obvious water implications, and although international agreement has not been reached on this, environmental concerns have been incorporated into national water legislation in some countries.

If we make explicit the water requirement needed to support other human rights, the human rights based approach implies water rights that go beyond personal and domestic use. This approach proposes the inclusion of the following requirements:

- water for basic human needs;
- water for indigenous peoples;
- water for food security and other production at a family level;
- water for production at a level of community/national economy;
- water management to support a healthy human environment;
- water for the environment (for biodiversity as well as livelihoods based on environmental resources).

The specific content of these requirements is analysed in section 5.1.

Comparing the human rights based approach with the form of social equity proposed as a goal for IWRM (Figure 5) yields the following observations.

- There is no doubt that for a distribution of benefits to be considered fair, it must tend to the basic needs of people, whether those needs are incorporated into the standards that are recognized as human rights or not. In this sense, the goal of social equity is substantially more demanding than what is called for in a human rights-based approach, since equity refers to the complete spectrum of benefits and costs associated with water resource systems and not only to the minimum requirements that may be included in a definition of basic needs. However, when these minimum requirements are recognized as human rights, they are demandable and their provision is an obligation, under the principle of 'progressive fulfilment'.
- The many benefits that are beyond the scope of basic needs are, nevertheless, subject to the goals of social justice that a certain society has or aspires to. The political goals of society regarding the conditions of life of its members, not only in relation to water, reflect the multiple factors that are present in its historic development and in its current situation. In this way, the goals of greater social justice that are present in

the fight against poverty do not necessarily imply the existence of human rights to protect (even though this might be one of their purposes).

- On the other hand, treating these benefits as minimum requirements and assimilating them into demandable and obligatory human rights, even when they are social objectives rather than basic needs, may be damaging to the pursuit of greater equity in society. There are inequalities that are acceptable to societies and that may contribute to the improvement of the weaker sectors' conditions. Precisely, for example, this is the demand proposed by Rawls in the 'principle of difference' so as to consider a determined benefit distribution as acceptable from the perspective of equity.

Accordingly, the concept of social equity included in the IWRM approach should not be confused with the sole protection of human rights.

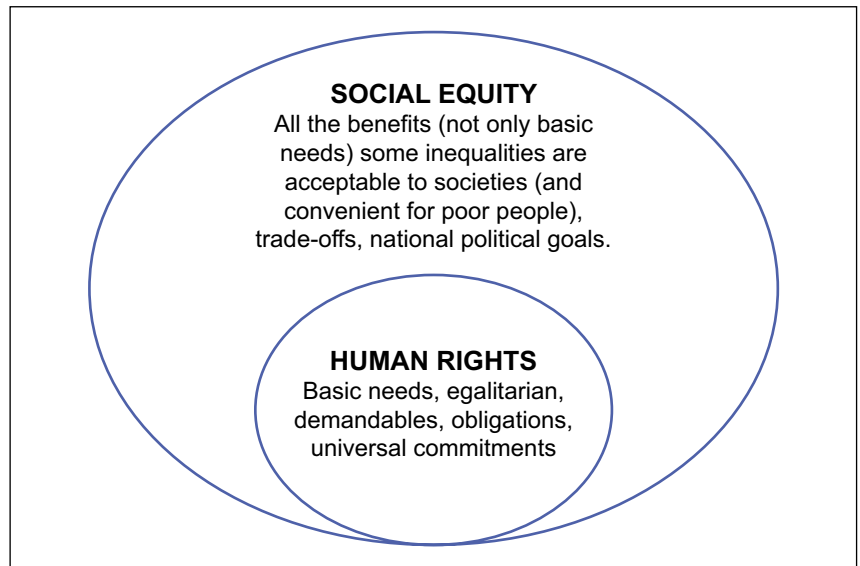


Figure 5. The relationship between social equity and human rights approaches

4. SOCIAL EQUITY IN WATER MANAGEMENT: EQUITY IN DECISION-MAKING PROCESSES

From the perspective of social equity, the approach to the decision-making process can be as important as the results of the process. As discussed in section 3.1, elements of procedural justice – such as impartiality and credibility of decision-making authorities; ability to participate in the process, express opinions and raise issues; access to appropriate information; and being treated with respect – contribute, as well as the substantive content of the rules, to the perception of equity.

Also, the features of water resources systems, which demand the interaction of numerous users in the different phases of water management, give special relevance to public participation and social learning¹⁸ in the governance of the sector.

Looking at the history of water management shows us that there are certain recurrent problems that compromise the equity of decision-making processes and trigger complaints from water users. The following sections provide a brief overview of these problems.

4.1 Nominal or practical absence of a normative framework

An institutional system that effectively regulates access to the different benefits provided by water resources, be it formal or customary in character, is an indispensable condition for socially equitable water management. The only exception to this rule is where there is no competition for resources, for example in areas where water resources are abundant and demands are relatively small. Nevertheless, in most cases the use of water resources is developed in a context of rivalry, and enough externalities are generated for usage rules to be indispensable. In these cases, experience shows that the absence of appropriate institutions is advantageous to the stronger members of society and detrimental to the weaker members. For example, in the case of over-exploited aquifers where there are no effective controls over extraction, the progressive depletion of groundwater levels means that those who are unable to afford the growing exploitation costs are no longer

¹⁸ K.H. Bowmer (2007). “Conflict Resolution in Regional Water Sharing: Opportunities for Social Learning”, ABARE Conference, Canberra.

able to access groundwater. Another common example is the uncontrolled discharge of contaminants into streams that damages the health of those, usually the poorest, who are dependent on the polluted water for drinking and livelihoods. Thus we see the importance of effective institutional systems in achieving social equity; anarchy does not favour equity.

4.2 Asymmetry problems

The decisions that must be made in the institutional system that regulates access are often technically complex and involve different interests (of individuals, groups, companies, etc.). From the perspective of equity, this creates the following challenges.

a) Communication

Communicating the nature of the decisions being made and the information that has a bearing on those decisions is a minimum requirement of equitable decision-making. If all the players do not have access to the same information, the process cannot be equitable. For this reason, the obligation to publish such information through different media and procedures – depending on local conditions – is commonly enforced. In Chile for example, new requests for water rights or for changes in existing allocations must be published by law, in the country's newspapers on certain dates and with certain formalities. This procedure had to be enlarged to include radio, since newspapers proved to be an ineffective form of communication in rural areas. In any case, the efforts made at communication are generally insufficient in informing stakeholders because the subject matter of these decisions – although it may be very important – is marginal in relation to most people's everyday concerns. In very large systems, indirect representation of a group's interests and a proactive attitude of the State towards informing potentially affected groups are the most common solutions to this challenge.

b) Training stakeholders in the proper use of the legal and institutional system and its guarantees

In places where the institutional system is not based on ancestral practices, normative knowledge is often difficult for the non-specialist to understand and use. This produces great asymmetries between those (for example large companies) who can afford the relevant expertise and the great mass of potential parties that may have an interest in the subject. This information asymmetry enables some groups or users to obtain advantages that are detrimental to the majority. For this reason, the State needs to act positively

through programmes that are specific to adequate knowledge diffusion and training, or intervene ex officio to protect the interests of the weaker ones.

For all parties to be able to engage in effective and sustainable participation, they must have the capacity to organize and negotiate. Thus, the social capital of water user organizations and other civil society bodies plays a decisive role in the quality of negotiations within the water sector and in the level of equity reached by the system. In this context, of great importance are increasing social learning by the weakest sectors, strengthening their self-confidence, and building their capacity to participate in debates and form alliances to further their interests.¹⁹

c) Specialized technical knowledge

The complexity of water resource systems means that decision making must often rely on a great deal of technical information and sophisticated management instruments – thus monitoring plans, research and publicly available data are required. However, the variability inherent in hydrological systems, the progressive and time-delayed nature of impacts from interventions in the system, and imperfect information can mask the true water resources situation. This information failure tends to have greater repercussions for downstream users, who are more vulnerable to shortages and upstream over-exploitation.²⁰ Also, imperfect knowledge of aquifer recharge and exploitation levels, along with the system's slowness in answering requests, results in overexploitation that is recognized too late by the stakeholders. Another area in which scientific and methodological knowledge deficiencies are often critical is the determination of environmental requirements.²¹ Thus, equity in decisions lies fundamentally in technical suitability and integrity of State action, since it is very unlikely for weaker social sectors to be able to invest in a technical counterpart to guard their interests.

4.3 Corruption and lack of transparency in procedures

A great threat to equity in water management is the corruption of the entities in charge of setting or enforcing the norms, as well as of the stakeholders. The risk of corruption generally depends directly on the levels of corruption present at State level and in the society of a particular country. In the case

¹⁹ IUCN (2010). *Negotiate. Reaching agreement over water*.

²⁰ P. van der Zaag (2007). "Asymmetry and equity in water resources management; critical institutional issues for southern Africa". *Water Resources Management* 21:1993–2004.

²¹ N. Schofield, A. Burt and D. Connell (2003). *Environmental water allocation: principles, practices, policies, progress and prospects*. Land & Water Australia: Canberra.

of water management, this risk is compounded by the complexity of water resource systems, which makes it difficult for the public, and for the State itself, to control corruption.

Water has been identified as a high-risk sector for corruption, particularly because accountability is difficult to maintain when water management responsibilities are often distributed across many agencies and levels or concentrated within small groups with insufficient citizen participation and transparency and when the technical nature of the subject matter makes it inaccessible to the average citizen. Also, the informality that exists in some water distribution systems for the poor sectors can enable corruption and leave water users with no recourse. In addition, water resources projects often involve elevated levels of investment – making the stakes high.

According to a wide array of reports, the most frequent areas for corruption involve assignment of water permits and distribution, pollution control and environmental protection, and the performance and operation of systems for water supply and engineering works such as large irrigation systems or hydroelectric plants. Powerful groups can influence decision-making, whether public or private, through payments or by capturing the decision-making processes. These corruption problems are seen in both large decisions, such as the construction contract for a large dam, and small decisions, such as the diversion of a small stream to benefit one user, and in virtually all countries.^{22, 23, 24}

4.4 Discrimination

The concept of equity includes the idea that no individual can be favoured or damaged in decisions made by the authority in actions or in the regard of his or her rights because of gender, social status, religious or political beliefs, or any other characteristic. The most common form of discrimination has to do with gender, though there are also examples regarding social, racial, or political differences.

²² H. Elshorst and D. O'Leary (2005). *Corruption in the Water Sector: Opportunities for Addressing a Pervasive Problem*, in *Can International Water Targets Be Met without Fighting Corruption?* Stockholm World Water Week Seminar.

²³ Transparency International (2008). *Global Corruption Report 2008, Corruption in the water sector*.

²⁴ H. Tropp and P. Stålgren (2005). *The Dynamics of Corruption: Putting limitations to water development*, in *Can International Water Targets Be Met without Fighting Corruption?* Stockholm World Water Week Seminar.

The forms in which different societies express discrimination against women in the scope of water management have been documented in numerous studies.^{25, 26, 27}

In analysing discrimination it is important to consider that men and women usually play different roles regarding water, which are structured around considerations of socio-cultural, legal, and religious nature. They also have different needs, and they have different access to resources.

The different roles of men and women are seen in issues related to water and sanitation, as well as in irrigation. Regarding the first point, it is common knowledge that women are frequently charged with the task of preparing food, supplying the home with water, washing clothes, cleaning and maintaining hygiene, and educating children in their habits, among other tasks.

Men's and women's water needs and sanitation requirements are different, as are their preferences and concerns in this regard. Research shows a link between the deficiency of water access systems and sanitation and lower levels of female schooling. In addition, exposure and vulnerability to pollution, droughts and floods is usually higher for women, as are the costs that they must assume in their personal lives when they cannot count on access to water.

In some communities, women are presented with restrictions that affect their social and economic lives and that affect equity in water resource use, for example, as a consequence of limitations in access to property or credit. Likewise, disadvantages related to their educational situation restrict their ability to participate in the management of common interests. In such cases, simply creating gender-neutral water management will not be enough to reduce inequity.

This general context of asymmetry between genders regarding water management may lead to very conspicuous situations of inequity. Since

²⁵ *Mainstreaming Gender in Water Resources Management Why and How*. Background Paper for the World Vision Process 2000.

²⁶ *The Gender and Water Development Report 2003: Gender Perspectives on Policies in the Water Sector*. Gender and Water Alliance 2003.

²⁷ CAP-NET, GWA (2006). *Porque el género importa: Tutorial para gestores y gestoras del agua*. CD Multimedia y folleto. CAP-NET Red Internacional para el Desarrollo de Capacidades en la Gestión Integrada de los Recursos Hídricos, Delft.

these asymmetries are based on profound cultural conceptions, they are often perceived as 'natural' by those involved. These asymmetries must be considered in the design of institutions to ensure gender equity.

The following questions need to be considered.

- If priorities for action are organized specifically considering the priorities of both genders, recognizing the fact that priorities are often skewed in favour of men.
- If in the design of solutions, the needs and preferences of both genders have been addressed.
- If the costs and benefits of different alternatives have been analysed, considering the different impacts on men and women.
- If women are disadvantaged in their ability to participate in collective decision making, for cultural and/or educational reasons.

4.5 Problems of collective action and agency

In general, water management and use require collective agreements and efforts, which naturally leads to diverse forms of association between water users and other interested parties. In practice, these associations constitute the main instrument for people's participation in water management.

Such associations of water users, in which the government may participate to a greater or lesser degree, represent common interests to individual members, as well as to public authorities or third parties. In some cases, such associations may have primary responsibility for governing the water resource system. Since these organizations often have large numbers of members, they must develop an internal organizational system with representatives who may act on behalf of the group.

Many of these associations have a long history. They have persisted despite changes in the cultural, economic, and social environment, and their permanence shows the fundamental nature of their role.

Although these organizations are a means for users to participate in the business of water management, this does not mean that their existence guarantees social equity. As with many democratic organizations, it is a challenge to ensure that decisions equitably reflect members' interests and that the rights of all, especially those with less power, are respected.

Also as already mentioned, due to the complexity of water management, it is common for there to be an information asymmetry between the organization's representatives and its members, and that allows the leaders to act with a relative amount of autonomy. This situation is further enabled by the high percentage of members who often do not stay up to date with decisions affecting them and who do not participate actively in the organization. In addition, it is common for users' interests to have points of disagreement depending on geographic areas, economic capacities, productive features, etc., and for these to constitute a stimulus for representatives to act with special regard to their own interests, or the interests of a particular group.

Heterogeneity among the users in terms of economic power, educational levels, technical capacities, cultural differences, and political influence, enhances the risks of such problems. Thus, it is necessary to assess the equity of the institutional system that empowers the self-government of the organization.

The forms of organization that tend towards more equitable consideration of members can be very diverse, depending on their specific conditions. But there are some issues that deserve special attention, such as the following.

- Criteria for determining the level of influence in collective decisions: There are strictly egalitarian criteria, where all users have similar weight, or more or less complex forms of weighting the relative influence of members which consider, for example, water rights, land ownership, types of use, geographical sectors or others. In any case, the most adequate modality will be the one that guarantees the cooperation and rights of everybody.
- Rules for the approval of collective decisions: Particularly when it comes to decisions of great importance to the organization or that affect members' rights, extra checks beyond simple majority rules, may be needed.
- Allocation of functions within the organization: In particular allocations that avoid an excessive concentration of power, e.g. by separating the function of conflict resolution from that of decision making and creating neutral, often, external forums for appeal.
- Accountability mechanisms: This is an essential component in the organization's structure. Such mechanisms are particularly important, but also difficult to design when the matters being decided upon are very complex, to such an extent that only a few members (usually those in control) are able to understand them.

5. EQUITY IN THE PRACTICE OF WATER RESOURCES MANAGEMENT



In this chapter we consider equity in the activities that constitute water resources management, in particular activities that regulate the following basic decisions:

- The extraction of water from natural streams, aquifers or lakes, for use either for drinking or for productive purposes.
- Discharges into natural streams, which frequently mean risk of pollution, and in general those activities oriented toward quality management in the natural waters.
- The use of water in the natural environment or associated ecosystems, for example for sailing, recreation, fishing, tourism, etc.
- The preservation of the environment through regulation of minimum stream flows, groundwater levels, and others.
- The actions that alter natural streams and their operation or in the water regime of runoff, through control works, bank protection works, usage infrastructure, bridges, etc.

All these activities suppose an institutional system that may reflect laws, norms and formally defined institutions or accepted customary practices. Also, as discussed in Chapter 2, in each case the access regime may be that of a public good, without any restriction, or regulated.

From the perspective of social equity, this system must solve different challenges, for which there are diverse institutional solutions. The following sections describe some common challenges and related problems and possible solutions.

5.1 Guarding basic needs and minimum requirements

There are different requirements for goods and services for which societies set a minimum acceptable standard.

Many of these that are indispensable goods and services are discussed in the context of human rights, such as: water for basic human needs; for the preservation of cultural and religious values, especially for indigenous peoples; for food security at a family, community, or national level; for the preservation of a healthy human environment; for the preservation of the

environmental heritage and biodiversity; and for the livelihood of local populations based on environmental resources.

For these requirements to be safeguarded, they need to be recognized and criteria and standards need to be defined.

In some countries, reserve flows are set to meet minimum requirements for basic human needs, customary uses, and environmental demands.

a) Basic human needs

'Basic human needs' encompasses water supply for personal and home uses (2002 General Comment No. 15 of the UN Economic Council's Economic, Social and Cultural Rights Committee). These include drinking, personal sanitation, washing clothes, preparing food and personal and home hygiene. Meeting these needs requires between 25 and 100 litres of water per person per day according to the estimates of numerous experts.²⁸ In the UN's Convention on the Protection and Use of Transboundary Watercourses and International Lakes,²⁹ water for producing food, at least sufficient to prevent starvation, is also included (see Box 2).

The water required to meet basic human needs may vary significantly from one area to another, depending on factors such as climate, soil type, crops grown, and available technologies. The population's living conditions also impact water needs. For example, in arid zones where people depend on irrigated agriculture for food, the water requirements will be higher than in areas with higher rainfall and a pastoral way of life.

In most legislation, personal water needs are prioritized or are considered minimum uses with no need for specific authorization, though they are generally not recognized explicitly as a right. On the other hand, minimum extractions for survival are generally not legally defined, so their protection, through specific programmes and allocation criteria, depends on each society's equity goals.

b) Customary uses

The degree to which customary uses by indigenous communities are legally recognized varies from country to country. In some cases, the

²⁸ P. K. Wouters, S.I Vinogradov, A. Allan, P. Jones and A. Rieu-Clarke (2005). *Sharing Transboundary Waters An Integrated Assessment of Equitable Entitlement: The Legal Assessment Model IHP-VI Technical Documents in Hydrology No. 74*. UNESCO, Paris.

²⁹ 1997 UN Convention on the Law of the Non-Navigational Uses of International Watercourses.

country's colonial history has caused a contradiction between national laws and customary practices. There are countries with strong indigenous communities that have fully active customary rights, and countries with small indigenous communities that are largely integrated within modern society and which have no special rights, and everything in between.

A recent review of legislation in seven Asian countries revealed that only two countries expressly recognized customary rights.³⁰

In Africa, there are vast areas governed by traditional rules. In Zambia for example, 70% of the territory is organized in this manner, so tradition is in many cases, more important than formal laws.³¹ On other continents, the interests and rights of indigenous communities are protected by law. Such is the case in the USA, Canada and New Zealand, where there is strong recognition of customary rights.³² In Latin America over the past few decades, legislation has been developed that to an extent protects indigenous communities' uses and customs.

Where both modern and customary systems coexist, modern laws may be either in tension with customary rights or agree with them. This coexistence raises such questions, such as when must certain uses and customs be recognized as such? Which types of uses must be considered? What is the scope of this recognition?

As to the question of which customs should be recognized, The African Commission on Human Rights proposes recognizing only those that are immemorial, reasonable, which have continued without interruption since their immemorial origins, and that have certain and clear contents.³³

When considering the types of uses that should be protected, it should be recognized that indigenous cultures frequently have a concept of water that

³⁰ J. Bird, W.L. Arriens and D. Von Custodio (2008). *Water Rights and Water Allocation: Issues and Challenges for the Asian Region*. Network of Asian River Basin Organizations. Asian Development Bank RSDD Technical Note.

³¹ P. Chileshe, J. Trottier and L. Wilson (2005). *Africa Translation of water rights and water management in Zambia*. International workshop on African Water Laws: Plural Legislative Frameworks for Rural Water Management in Africa, Johannesburg, South Africa.

³² I. Gentes (2001). *Derecho de Agua y Derecho Indígena. Hacia un reconocimiento estructural de la gestión indígena del agua en las legislaciones nacionales de los Países Andinos*. Documento Conceptual para el Programa WALIR, Water Law and Indigenous Rights. Towards structural recognition of indigenous rights and water management rules in national legislation, Universidad de Wageningen, Países Bajos, y las Naciones Unidas-CEPAL, Santiago de Chile.

³³ African Charter (1998). African commission on human rights.

goes beyond its productive dimension and which assigns to water a symbolic and social role that is relevant for their world view. Also, although in many agricultural societies irrigation constitutes the largest water use, there are diverse other uses that are of great interest to communities, such as fishing or bathing in lakes and rivers, cattle grazing and hunting in wetlands, or the use of aquatic and riparian ecosystems as part of the livelihood and living conditions of certain people. To protect these uses may require not only the preservation of certain flows in terms of quantity, but also the consideration of quality and the integrity of the habitat and the biota.

Legal recognition of local uses and customs can come to contradict regulations and rights established by national legislation. The level of tension this generates depends on the scope given to the recognition. There are two main options for delineating the scope: by water use or by geographic area. For example, some countries have recognized certain concessions for the use of water resources that are managed according to customary law, but always within the context of national legislation. Other countries have recognized domain over a territory by the indigenous community including its natural resources, such as water.

The choice of one option or the other, or of intermediate options, is influenced by historical, social and economic factors and by the relative weight of indigenous and non-indigenous uses. To resolve this tension between different systems, the international community has proposed establishing mandatory mechanisms to ensure communities potentially affected by decisions are consulted, and in some cases implying that their consent must be obtained, as indicated for example in Article 19 in the United Nations Declaration of Rights for Indigenous Peoples (UNDRIP) and in the International Work Organization's (OIT) 169th Convention.

In any case, not all uses and customs have a similar priority from the perspective of equity, and the existence of customary law does not necessarily protect indigenous communities from inequitable situations. Thus, basic human needs should be considered priority goals for water management, along with the preservation of symbolic values and indigenous ways of life. Particularly in the case of water resources associated with the geographic domain of an indigenous community, the goals of water management must be analysed from the perspective of equity and merits, considering the different uses and users (some of whom may not be part of the indigenous community), and in relation to the criteria adopted by that society to define

an equitable situation. This consideration is especially pertinent in societies in which indigenous and non-indigenous sectors are active, in which they share territory, and in which there are also processes of cultural change and integration of indigenous communities. In Chile's case, some communities manage water according to traditional norms, while others – more integrated with urban social and economic dynamics – have adopted the country's general rules.

c) Minimum environmental requirements

The conservation and protection of the environment, as an objective of water management, has a clear relation to the society's approach to social equity.

The two are connected in several ways:

- The ability of future generations to benefit from water resources depends on sustainable use in the present.
- Water-dependent ecosystems, such as wetlands, are an important resource, especially for poorer populations.
- There are also numerous negative externalities that affect public goods and other beneficiaries of water resources.

For these reasons many countries have, to various degrees, incorporated environmental concerns into their water legislation in the past few decades, and it is a trend that is still growing.^{34, 35} In some of this legislation, the water resources required for the environment are conceived as a right, and in others, environmental demand must compete with the other uses. In South African legislation, the water allocation process distinguishes between 'The Reserve', allocated to meet basic needs and minimum environmental requirements, which has priority, and the rest of all resources, which are distributed using general equity criteria.

Environmental water demand is generally understood as the water quantity and water quality required to maintain a particular ecological character in wetlands and water bodies in general, i.e. the combination of the ecosystem components, processes and benefits/services that characterize the wetland at a point in time. Among these processes and benefits/services are water resource regulation, transportation, tourism, production, habitat generation and elements of cultural importance.

³⁴ S.M.A. Salman and D. Bradlow (2006). *Regulatory Frameworks for Water Resources Management. A Comparative Study. Law, Justice, and Development Series.* The World Bank.

³⁵ ESCWA (2003). *Sectoral water allocation policies in selected ESCWA member countries: An evaluation of the economic, social and drought-related impact.*

Thus, water resource management must consider four types of requirements³⁶:

- i. Discharges in streams and estuaries, stagnant waters levels, and phreatic levels for groundwater.
- ii. Water quality, including physical, chemical and biological parameters.
- iii. Habitat integrity, which considers aspects such as the morphological structure of streams and riparian vegetation.
- iv. Biotic integrity, which includes the health, community structure and distribution of biological diversity.

Meeting environmental requirements not only represents a challenge in the normative scope – defining norms, rules and laws – and in building social agreements to support the decision making processes, but also in technical terms. A vast array of methods has been developed to assess environmental requirements and propose forms of water management that are environmentally acceptable. These include very simple procedures based on hydrological variables, hydraulic methods to physically characterize habitats, more complex methods to simulate habitats for certain relevant species, and holistic methods for ecosystem evaluation.

Despite this technical progress, there remain considerable gaps in our knowledge and understanding of the relationship between the environment and water resources. Thus assessing the impacts of water management frequently involves great uncertainties.³⁷

In some developing countries, lack of research-based knowledge of the environment and specialist databases limit the use of new technical tools and management instruments. Thus in recent years, the use of more flexible, adaptive approaches has been proposed that seek to overcome weaknesses in our knowledge through a learning process that operates in an integrated manner with water management.

³⁶ RAMSAR (2007). Handbooks for the wise use of wetlands. *Water allocation and management. Guidelines for the allocation and management of water for maintaining the ecological functions of wetlands.*

³⁷ N. Schofield, A. Burt and D. Connell (2003). *Environmental water allocation: principles, practices, policies, progress and prospects.* Land and Water Australia.

General comment on the definition of basic needs and minimum requirements

To carry out the tasks of guarding basic human needs and securing customary uses and minimum environmental requirements, countries need institutions that ensure the effective participation of all interested groups. Participation is important in defining standards, criteria and minimum acceptable values. However, this process also requires knowledge of all features and capacities of the local environment and the human system associated with it – in other words, expert knowledge.

Generally, water management has incremental impacts and benefits that are not subject to thresholds or behavioural jumps, except in the case of extreme situations. Thus, setting a ‘minimum’ allocation is the result of a technical and social convention based on what is considered indispensable. These standards evolve according to changes in the social context. Beyond this ‘minimum’, there is a space in which there are trade-offs between the objectives of social equity, environmental sustainability and economic efficiency. In this context, the challenge is to reach agreements that are accepted as equitable by the involved parties. The standards or allocations defined will vary and will depend on the results achieved in the protection of goods, values, etc.; advances in knowledge; standards of living and the society’s values. In any case, failure to safeguard minimum requirements can present very serious consequences for people and ecosystems.

Defining minimum requirements is an activity that takes place in the public sphere, within entities that may be more or less local and may have more or less stakeholder representation. Economic mechanisms, such as those of the market, are not useful here, since the protection of certain goods and services is based on moral value judgments, as adopted by society, and not on economic logic.

5.2 Initial water allocation between different sectors and users

Once basic demands and minimum requirements are met, the next question from an equity standpoint is how the remaining benefits from the water resources system are distributed. For the distribution to be considered equitable, it must be consistent with the demands of public ethics accepted by society (equal opportunities, etc.), and keeping in mind that the process followed to determine the distribution of benefits is as important as the distribution itself, as was discussed in Chapter 4.

However, we must bear in mind that social equity is a goal that affects and is affected by society and its activities as a whole. It is determined by more than just water. Water management can contribute to achieving social equity in a society or it can be an obstacle to it. It is also true that different cultures may have different ideas on what constitutes equity in water management. For example, in the traditional culture of the Andes, each family that is a part of the community and fulfils their collective obligations is considered to have a right to water. The distribution criteria may however, vary from community to community, such as proportionality with demand, equality per family, contribution to common work, social considerations (for example, the privileged status of elderly people in some cultures), type of crop, number of people per family, location within the irrigation system, and others.³⁸

Notwithstanding these cultural differences, in the case of authorization for the extraction of water for private use, the following basic systems for water allocation have been identified:

- i. Riparian rights: In this system, owners of riparian land have the right to extract water from the stream for reasonable use; thus riparian users share water resources. This system is common in countries that developed their hydraulic systems under British influence, as is the case in eastern USA.
- ii. Prior appropriation: Based on the principal of 'first in use, first in right', this system, which has been widely applied in the western USA, recognizes the right to the extraction of water resources depending on chronological order of use, regardless of land ownership.
- iii. Public allocation: This system grants the task of allocating water resources through use concessions to a public authority. The underlying principle is that water resources are the nation's property. It has a long-standing tradition in many countries, among them France, Spain, Portugal, and their territories of influence. Public allocation systems may also enable users themselves to determine local allocations.

These basic allocation schemes have evolved gradually toward more complex systems that allow for the coexistence of elements from different doctrines,

³⁸ R. Boelens (1998). *Gestión Colectiva y construcción social de sistemas de riego campesino. Una introducción conceptual. En Buscando la Equidad. Concepciones sobre justicia y equidad en el riego campesino.* Editado por R Boelens y G Dávila. Van Gorcum.

depending on factors such as flow discharge, type of water source, historic background, etc. In addition, the growing importance of water resources in the development of societies, the ethical and religious views on water, the public goods involved, and the complexity of the interrelations in these systems, have all led to greater State involvement and influence in water management. The current widely accepted view is that water resources – both surface water and groundwater – should fall under the State's dominion and that the State should be responsible for controlling, regulating and allocating water resources.³⁹

On the other hand, in recent decades, growing water scarcity and the resulting need to improve efficiency have led to the incorporation of economic criteria, including pricing and market mechanisms, into water allocation decision-making processes.⁴⁰

However, assessing the economic efficiency of various allocation systems may go beyond strictly economic criteria such as production value per unit and opportunity cost, to include criteria such as flexibility, legal security, predictability, equity, public acceptance, politics, efficacy and administrative feasibility. Using these criteria, Dinar et al. (1997) assessed diverse examples of four allocation systems: marginal cost pricing, public allocation, user-managed allocation, and water markets. They concluded that there is no one type of allocation system that is best in every context and every allocation mechanism presents advantages and disadvantages.⁴¹ A comparative study on allocation systems in East Asia reached a similar conclusion.⁴²

Tisdell (2003) assessed criteria for water allocation from riparian rights, prior rights and public allocation from the perspective of diverse doctrines on social justice, particularly the one developed by utilitarianism, Rawls and Nozick. His analysis concludes that equity objectives may be achieved through public allocation, but that over time, approaches such as riparian rights and preferential rights – which have limitations from the perspective of social justice – have also evolved to incorporate the principles of equity and social justice.⁴³

³⁹ S.M.A. Salman and D. Bradlow (2006). *Regulatory Frameworks for Water Resources Management. A Comparative Study. Law, Justice, and Development Series.* The World Bank.

⁴⁰ Ibid.

⁴¹ A. Dinar, M.W. Rosegrant and R. Meinzen-Dick (1997). *Water Allocation Mechanisms Principles and Examples*, Policy Research Working Paper 1779, The World Bank and International Food Policy Research Institute.

⁴² ESCWA (2003). *Sectoral water allocation policies in selected ESCWA member countries: An evaluation of the economic, social and drought-related impact.*

⁴³ J.G. Tisdell (2003). "Equity and Social Justice in Water Doctrines". *Social Justice Research* 16(4).

Ultimately, the equity of a water resource management system strongly depends on the context in which it is applied, and, in general, current systems are the result of a conditioning process shaped by the equity goals that society has imposed on itself.

To assess the equity of public policy, a pragmatic approach is required that considers, within a wide context, the outcomes of the system as a whole, including the effect of policies and instruments outside of the water sector.

Many current allocation systems are based on whatever rules were first recognized; property rights, heritage rights, customary rules and other traditional dispositions are taken as fundamental principles, without significant social questioning. In other cases, the original situation lost legitimacy (be it gradually or suddenly) from the perspective of equity, and initiatives seeking to modify it took place, as in the case of South Africa's water reform at the end of the apartheid era or Chile's redistribution of land and water during the agricultural reforms of 1967–1973, which ended the large landowner-based regime that had been in place since colonial times.

Situations and perceptions do of course change, but the main principles of justice that are accepted by society are intended to be stable and lasting; otherwise they would infringe on the premises of fair play that are at the heart of the way any community functions. From this, we can deduce that if the rules that are accepted by society generate inequalities, then those inequalities must also be acceptable to the society so that they are defended by all, regardless of the position each individual is in.

Although it is not possible to have a simple criterion for determining if in a particular case water management contributes to or is an obstacle to equitable development, some elements that should be present within a particular institutional system for the system to be satisfactory may be identified.

- a) **Integrated analysis:** The analysis of benefits in the water resource system from the perspective of equity, must have a systemic focus that looks at the balance between benefits and costs – direct or indirect – generated as a result of interactions and feedback between natural and human systems, as described in detail in Chapter 2. If the management system does not include mechanisms for considering all the possible interests in play, plus the indirect effects and externalities that may be present, it will not yield equitable results.

- b) Goals for rational and beneficial use:** In situations of scarcity, an allocation that deprives some and does not benefit the rest cannot be considered equitable. Or, in other words, an additional allocation whose marginal benefit is void is not acceptable. Legislation in many countries and in international agreements such as the United Nations convention on transboundary waters, includes beneficial use as a condition for legitimate use. Thus, equity among different beneficiaries is understood as taking place within beneficial and rational uses. In this context, beneficial use is understood to be “a use that is generally recognized as an economic and socially valuable use”, but “it needs not be the most productive use water can be put to, nor needs the most efficient method to ensure maximum exploitation be applied”, and it excludes unnecessary waste.⁴⁴ Rational use includes criteria such as avoiding practices that may generate harmful effects, avoiding water resource development that is not sustainable, and avoiding water resource waste where technically and economically feasible. In some countries, rational use may also include criteria that favour multiple uses of the resource and other criteria of general interest.⁴⁵ Applying these criteria does not demand the enforcing of an optimization process, but it does imply the responsibility to respect water as a valuable resource that should not be wasted and to take advantage of technological possibilities for improvement that are within the users’ reach.
- c) Trade-offs between social equity and economic efficiency:** Benefits and costs must be considered in any solution that seeks a compromise between social equity objectives and economic efficiency.

However, before trade-offs are considered, there are two use categories that must be addressed, the first because water should always be available to fulfil its demands, and the second because water should never be available to fulfil its demands. These categories are described below.

- Those uses associated with basic human demands and minimum requirements, as described in section 5.1. These must always be satisfied and are already included in legislation in many countries. For example in South Africa’s case there is an express definition of this category under the denomination of The Reserve (see Box 2).

⁴⁴ P.K. Wouters, S. Vinogradov, A. Allan, P. Jones and A. Rieu-Clarke (2005). *Sharing Transboundary Waters An Integrated Assessment of Equitable Entitlement: The Legal Assessment Model*. IHP-VI Technical Documents in Hydrology No. 74 UNESCO, Paris.

⁴⁵ S.M.A. Salman and D. Bradlow (2006). *Regulatory Frameworks for Water Resources Management. A Comparative Study. Law, Justice, and Development Series*. The World Bank.

- Non-beneficial uses as described in point (b) above since these constitute waste. In a way, the criterion of beneficial use supposes the demand for a minimum of economic efficiency, compatible with common local practices.

After these use categories are addressed, the remaining water uses must be evaluated in terms of their benefits and impacts on equity/inequality. Not all will be acceptable. Acceptability may be determined with the following perspectives, which are analysed in more detail in the conceptual approach presented in Chapter 3.

- i. The distribution of the benefits and the total utility of a water resource system are interrelated subjects, since an equal distribution beyond certain limits introduces disincentives and inefficiencies. Thus each society must determine what level of inequality is acceptable, especially for the weakest members.
- ii. From a utilitarian perspective, which is oriented toward the economic maximization of total benefits, a situation of inequality that does not contribute to greater economic benefit is unjustified. In other words, there is a group of uses that is not justified from an economic point of view, let alone from the point of view of social equity, and consequently these are not subject to trade-offs between both objectives.
- iii. From an opposing perspective, in the context of a strongly egalitarian vision (Rawls's Principle of Difference), only such inequalities that mean greater benefit toward the poorest sectors are acceptable. Thus according to this criterion, we could justify the allocation of resources that contribute to increasing benefits for some groups or sectors of society, as long as we simultaneously generate benefits for the poor. This reasoning identifies a point of greater benefit for the poor, which also corresponds to the maximum level of acceptable equality according to the aforementioned criterion.

Between the perspective that uses economic efficiency as the primary criterion (as described in point ii) and the one that gives greater importance to benefits for the less fortunate (as described in point iii), there is a space for solutions where the gains in equality mean losses in economic efficiency and vice versa. This is the space for trade-offs between both objectives. On the other hand, beyond this range there is a wide array of alternative uses that are

neither desirable from a social equity perspective nor an economic efficiency perspective. In other words, they are lose-lose situations. Thus, the need for trade-offs only appears in the space for win-lose alternatives.

To achieve an acceptable combination of equity and efficiency objectives in the distribution of costs and benefits, there are two basic types of instrument that can be of use. These are technical instruments, which are oriented toward assessing and maximizing/minimizing the benefits/costs, and institutional instruments, which strive to guarantee adequate participation by the different stakeholders so as to obtain an equitable and acceptable solution.

In the category of technical instruments, there are a wide range of economic engineering methods oriented toward project assessment and optimal resource allocation. These are used extensively in the planning and evaluation of large projects. Among the most used methods are models for simulation and optimization, such as the multi-objective programming techniques. Also, multi-criteria decision-making frameworks are especially interesting in the context of equity because they allow for the assignment of different weights to the different kinds of benefits that result from water management.^{46, 47}

Likewise, in recent years Game Theory has been applied to water allocation in an effort to better understand the different options open to users in water management systems.⁴⁸ Also, through different mathematical algorithms it is possible to optimize the allocation of water resources, applying distribution rules to the resulting benefits, such as the Leximin rule, which corresponds to the allocation criterion seen in point iii above.

Notwithstanding these developments, there is no single measuring technique that can be used to compare all the impacts of water management, which vary greatly, and that will be equally acceptable to all stakeholders. The task of measuring is complicated by the fact that there are some benefits, most notably those associated with production, that can be directly valued, and others that it is difficult to place a value on, such as those associated

⁴⁶ L. Wang (2005). *Cooperative Water Resources Allocation among Competing Users*, University of Waterloo, Canada.

⁴⁷ P.K. Wouters., S. Vinogradov, A. Allan, P. Jones and A. Rieu-Clarke (2005). *Sharing Transboundary Waters*.

⁴⁸ L.Z. Wang, L. Fang and K.W. Hipel (2003). "Water Resources Allocation: A Cooperative Game Theoretic Approach". *Journal of Environmental Informatics* 2(2):11–22.

with improved environmental quality, decreased hydrological uncertainty, equity goals assumed by society, and the intrinsic value of water. In addition, different goods and services associated with water are valued differently by different people and groups. For example some may attach more importance to scenic beauty or recreation than productive uses. Thus, there are even examples of water allocation negotiations where interested sectors have agreed to set aside consideration of economic benefits.⁴⁹

Greater efforts must be taken to develop comprehensive approaches to express in quantitative terms the impacts of the diverse management alternatives in order to support negotiation processes between the stakeholders.

As discussed in Chapter 4, quality participation and negotiation is crucial for achieving solutions that are acceptable and lasting from the point of view of social equity and economic efficiency. For regional or local decisions, negotiation processes can take place in the context of user organizations. For determining the larger 'rules of the game' and defining institutional systems, national or state-level bodies are needed.

In water management practice, the issue of balance between equity and efficiency can be very critical when the use of water results in different levels of productivity that depend on the economic sector, the type and efficiency of use, and the endowment of other productive factors. In such instances, one endowment of water resources given to different users may generate very uneven benefits. For this reason, the application of allocation criteria oriented exclusively toward the maximization of production (for example 'more crop per drop') can lead to the concentration of resources in those sectors that are more productive, or in groups that can afford to apply better productive or commercial technologies.

However, the trade-offs between equity and efficiency can be minimized through State action to diminish the productive gap between the different sectors, through training programmes, technological support, etc. The purpose of some policies may be to correct equity problems while avoiding losses in economic efficiency, thus creating scenarios that are favourable to the progress of both equity and efficiency (win-win).

⁴⁹ J. Jordan (2006). *Negotiating Water Allocations Using a Comprehensive Study Format: The "Tri-State Water Wars"*. Agricultural and Applied Economics, University of Georgia.

Thus, from the perspective of equity, we have three options for public policy:

- i. Accepting a loss of economic efficiency in order to create a more equitable situation for the weaker sectors of society, considering the opportunities that water offers for their economic and social development. For this policy to be reasonable, it should not go beyond the point where benefits for the aforementioned sectors begin to diminish as a result of the decrease in economic efficiency.
- ii. Developing programmes to increase economic productivity in the weakest sectors, thus improving the use of a valuable good, water, in the context of greater equity. Examples of this strategy include government programmes that support the development of irrigation infrastructure and that create incentives for technological change and agricultural improvements.
- iii. Using public instruments for the redistribution of income, such as tariff systems, taxes and subsidies, with the purpose of transferring benefits to the weaker sectors without diminishing the economic productivity of water resources.

Section 3.1 and Figure 4 describe the process that shapes trade-offs between the objectives of social equity and economic efficiency.

In any case, it is important to keep in mind that these trade-off processes need to adapt to economic and social dynamics. This issue is analysed in section 5.4.

In Box 2 we present the South African experience on achieving equity in water allocations.

5.3 Distribution of benefits in geographical space

Since water impacts many different levels – local, regional, national, or even international – it is important to consider the issue of benefit distribution within geographic space.

This matter is regulated generally by the country's political organization, which recognizes that water in the natural environment is common property and belongs to the State, regions, other local bodies, or directly to users in function of certain rules. In this way, these definitions – exogenous to

Box 2: Allocative equity in South Africa

South Africa is amongst the most water scarce countries in the world, with just 1110 m³ per person in 2005.⁵⁰ South Africa's rainfall is highly variable, accentuating the impact of scarcity and intensity of use. In these conditions, water allocation can be expected to be contentious with competition between different sectors and users. What are the issues and how does South Africa address equity?

South Africa already gives priority of use to basic human needs by 'reserving' a small quantity (25 litres per capita per day) of available water resources in any river for this purpose. A similar provision of 'reserves' of water for environmental purposes is determined according to the environmental priority and conditions of each stream. But an overarching socio-economic issue in South Africa is the stark inequality between the country's different racial groups. A general objective of the government is thus to reduce this inequity. This is reflected in the water sector with the South African National Water Act making specific provision for action "to redress the results of past racial and gender discrimination"⁵¹ when issuing water licences. Yet this guidance provides no easy allocation mechanism to ensure equity, and that has different dimensions and depends on the boundaries within which it is to be achieved. These dimensions include:

- equity in access to the right to use water resources,
- equity in the benefits from water use, including:
 - financial benefits to the economy,
 - employment benefits deriving directly from water use,
 - social benefits deriving from the government's share of the economic benefits.

The key boundary is between the riparian community and other national communities. Some aspects of this were investigated in detail in the particularly stressed Olifants river in the north-east of the country, using the GINI coefficient, the traditional economic methodology to measure inequality within a society.⁵² The researchers considered two dimensions. When they determined the number of registered water users and the volume of water allocated to them, they found very high levels of inequality in physical access to water (GINI = 0.96). However, they acknowledged that this was not particularly meaningful, since 'users' included entire municipalities, withdrawing water for human use by large populations and industries employing large numbers of people.

When they considered the number of people employed for each water use as a proxy for the benefits of rural water use, the situation was very different. The 'employment GINI' at 0.64 showed that the benefits were much more widely shared than the physical water. The research did not however, consider the economic benefits in terms of production values outside the catchment where substantial benefits accrue both through direct economic activity as well as, crucially, to the public sector through taxation. This perspective reveals a completely different picture.

⁵⁰ WWAP (2005). *World Water Development Report 2*.

⁵¹ Republic of South Africa, National Water Act No.36 of 1998 S27.

⁵² J. Cullis and B. van Koppen (2007). *Applying the Gini Coefficient to measure inequality of water use in the Olifants River Water Management Area, South Africa*. Colombo, Sri Lanka: International Water Management Institute. IWMI Research Report 113.

Box 2: Allocative equity in South Africa (continued)

At the national level, estimates of the value of water in the dimensions of i) contribution to GDP, ii) contribution to employment, and iii) economic benefit to low-income households specifically, show that urban and industrial users contributed far more to all three dimensions per unit of water than commercial agriculture and forestry, while subsistence agriculture extracted the least value per unit of water as shown in the table below.

Sector	Gross Domestic Product (Rand/m ³)	Employment number (million m ³)	Low Income House-holds (Rand/m ³)
Urban sector: Commercial and industrial consumers	R498.83	1,745.73	R158.47
Rural – subsistence agriculture	R0.89	21.64	R0.17
Commercial irrigation	R2.80	133.79	R0.70
Commercial forestry	R1.96	57.02	R0.31

Source: Department of Water Affairs, *Water for Growth and Development in South Africa Version 7, Pretoria, 2009.*

What this example illustrates is that simple measures of equity in access to water were unlikely to be good indicators of overall social benefits. Only if an artificially narrow view is taken by restricting consideration to rural users (as opposed to urban and industrial uses) for instance, is there even any question about the most equitable societal use of a limited resource.

Given these considerations, it is recognized that equity as an explicit objective cannot usefully override other objectives, and in s.27 of South Africa's National Water Act, "the need to redress the results of past racial and gender discrimination" is only one of 11 factors that must be considered when a decision is taken on granting a new order water licence.

Author: Mike Muller.

the water sector – define the geographical space in which equity criteria are applicable. The case of transboundary river basins and aquifers, when benefits are shared between geographical spaces that do not have common jurisdiction, is not treated in this paper.

Water uses with benefits that are not felt locally, at the water's source, but at national levels or in distant locations, tend to arouse controversy, particularly if local or riparian communities are negatively impacted by the use. Examples include transferring water resources between water basins, hydroelectric uses and some mining uses.

In the case of hydroelectric use, the difficulties surrounding benefit/cost distribution are particularly thorny. Hydroelectric generation is part of

national energy planning, and through electricity distribution the nation as a whole benefits. But this use may reduce flows available for uses that generate local benefits, or it may negatively affect the river's landscape, environmental or recreational value. The situation is even more complex when it involves infrastructure works that directly affect local populations, such as the construction of dams that require relocating numerous inhabitants.

In these cases, the search for an equitable solution requires a negotiation process with adequate representation by all parties, and technical support capable of identifying and assessing benefits and damages for all sectors. The results of such a process should ensure that local communities are compensated for damages and that they receive a share of the benefits.

In Argentina, the national government created a great deal of controversy when it moved to privatize the country's hydroelectric stations, which use water resources allocated to provinces. The solution adopted, as the result of different negotiations between the Federal government and the provinces, was to share a percentage of the benefits obtained from electricity generation with the provinces involved, and other forms of compensation.

In the case of large mining, water use may generate important local benefits through the generation of jobs and through its impact in regional commerce and industry. However, the primary benefits are usually obtained through companies that operate outside of the local space and pay taxes to the State. In such cases, there needs to be instruments to ensure that some of these revenues go to the local areas.

The transfer of water resources between basins is frequently a subject of much controversy – controversy that has led to the failure of numerous projects. However, sometimes this kind of initiative has been very successful and has allowed the advancement of economic development and social welfare in both basins. To reach a solution acceptable to all interested parties, there must be consideration of possible losses of use and non-use value in the originating basin as well as the benefits in the target basin. In the end, negotiations generally involve investments and commitments by the State that seek to compensate for damages and share the benefits. The process of discussion and approval of Spain's National Hydrological Plan provides an especially interesting example, which reflects the economic, social and political nature of these conflicts as well as the difficulties of reaching alternatives that are considered fair by all users (see Box 3).

Box 3: Water planning, inter-basin transfers and equity issues in Spain

The National Hydrological Plan in Spain was established as a framework for the effective co-ordination of river basin plans and the management of water resources in accordance with the principle of ‘collective solidarity’ (Article 45.2 of the Constitution), taking account the scarce nature of water and its spatially imbalanced distribution in the country. The Ebro (north-east Spain) inter-basin transfer to south-east Spain was the major project under the Plan. The proposal was to solve severe degradation of the south-eastern Júcar, Segura and Sur basins, by transferring 820 hm³ from the Ebro to areas 750 km away, as well as sending an additional of 200 hm³ to Barcelona, 180 km to the north. The transfer was seen as “the most efficient [solution], after considering all other alternatives, and carrying out a rigorous cost–benefit analysis of water transfers, valuing environmental, socio-economic and technical variables and submitting the analysis to a wide social debate.” The transfer was formally designed on the basis of cost-recovery principles, and an environmental charge (transfer tariff) was established (Article 22, Law 10/2001)⁵³ to compensate for ecosystem service losses in the Ebro basin.

What was then so controversial about the transfer? What equity issues were at stake?

The main (formal) argument against the transfer was that the government should focus its effort on reducing water demand rather than looking for supply-side solutions. Albiac et al. (2006)⁵⁴ analysed both the costs of alternatives and the response of demand to water prices, pointing out that the Spanish water authority had ignored these critical aspects. And indeed, policy instruments were put aside without proper consideration, such as water pricing (based upon ‘full cost recovery’ principles), abstraction limits both on surface and groundwater resources, water markets, revision of water concessions, measures for quality improvement (the so-called ‘good ecological status’ of water bodies following the 2000 EU Water Framework Directive guidelines), or even alternative resources (desalination, water re-use, etc.).

In addition, there were several methodological misconceptions in assessing the cost and benefits of the project, including failure to take into account uncertainty in estimating future costs and benefits. These misconceptions had implications for equity because they resulted in the overestimation of benefits from water for farmers in receiving basins and underestimation of benefits from water to the farmers in the Ebro basin. Environmental concerns, including energy costs and conservation of water flows to support ecosystem services in the Ebro delta, also did not receive enough attention in the proposal.

Advocates of the Ebro inter-basin transfer argued that it would contribute to territorial social cohesion, via the creation of wealth in south-eastern Spain. Again, from an efficiency perspective, a project can only be deemed optimal if those better off with the transfer do not gain welfare at the expense of those worse off with the transfer, regardless of who is a winner or a loser. From an equity perspective, the State should have taken into account who specifically would have lost and who would have won with the transfer and used distributional weights to appraise the social profitability of the proposal.

⁵³ Ley 10/2001, de 5 de julio, del Plan Hidrológico Nacional (B.O.E. núm. 161)

⁵⁴ J. Albiac, M. Hanemann, J. Calatrava, J., Uche and J. Tapia (2006). “The rise and fall of the Ebro water transfer”. *Natural Resources Journal* 46(3).

Box 3: Water planning, inter-basin transfers and equity issues in Spain

Decentralization, which has had some beneficial outcomes, has also created some confusion in terms of equity discussions. It is widely believed that equity is to be read in terms of legal competencies (regional governments did play a very significant role, although not always to shed light, in the Ebro transfer public debate). It should be clear, though, that equity should be analysed in terms of citizen rights, no matter who has the legal competence on water resource management.

The Ebro inter-basin transfer proposal was cancelled after a different Government took office in 2004. The legal amendment (11/2005, June 22nd) was passed in 2005 after very intense public debate and participation. The new Government approached scarcity problems in south-eastern Spain through the AGUA project, whose main thrust is to increase water supply via water desalination. Deficiencies in social project appraisal still remain, although there have been significant improvements thanks to the EU Water Directive adoption process.

Official reasons for the transfer cancellation were the overestimation of benefits and the underestimation of costs, the inadequate explanation and analysis of pricing issues, the wrong estimation of the price-elasticity of demand, threats to ecological flow conservation in the Ebro, the ecological threat of invasive species expansion, lack of analysis of energy provisions, lack of rigour in the estimation of surplus water to be transferred, and the subsequent opposition of the European Commission authorities which would have conditioned project funding.

Beyond the explicit recognition of the public determination to contribute to the spatially balanced development both of north-east and south-east Spain, equity principles were not taken into account in a very rigorous manner. On the other hand, equity issues were clearly at stake in the public debate. The EU Water Framework Directive (2000) explicitly mentions the aim of taking account of the “balanced development of [EU] regions”. This is linked to the concept of “disproportionate costs” (Articles 5 and 7), central to the Directive. Article 7.d states that “the beneficial objectives served by those modifications or alterations of the water body cannot be achieved, for reasons of technical feasibility or disproportionate cost, by other means, which are a significantly better environmental option.”

Author: Gonzalo Delacámara.

5.4 Re-allocation between different users and sectors

The institutional system of access to water and its benefits must necessarily give great importance to stability and the permanence of its authorizations. This is because of the magnitude of resources and investments that must be employed for the use of water, and because the use of water allows for the existence and development of whole communities and gives rise to particular lifestyles, and thus it should not be possible to reduce or take away water allocations without very good reason.

This need for stability has been addressed using different approaches. Thus, for example, the authorizations for the extraction of water from natural courses have a variable period of validity depending on the country. These can range from 10 years to cases in which they are granted in perpetuity. Other authorizations, such as those associated with environmental demands or the installation of infrastructure may present the same or greater conditions of stability.

On the other hand, the institutional system must also have the flexibility to:

- adapt the original decisions to changes in hydrological, environmental, social and economic conditions, and
- deal with new requirements, for example to make provision for new demands, environmental conservation, or construction of infrastructure.

There are two basic approaches to meeting this need. In the first, State institutions are given the function of revising previous decisions and adjusting them to new realities. In the second, market mechanisms enable direct negotiation between current rights holders and those with new water requirements. These two approaches can also be used in combination.

In the first approach, a system of periodic review is conducted by the responsible authority. From the perspective of social equity, the benignity of this solution depends fundamentally on the quality of the institutional system, both from a normative point of view and in its practical enforcement. The norms can be fair, but these may not be applied equitably if the institutions that are responsible are characterized by low levels of transparency, evidence scarce technical capacity, corruption or elite capture. When scarcity makes it difficult to meet new water demands, the most common response is for State institutions to create publicly funded programmes to increase resource availability or improve efficiency, so that meeting new demands need not significantly impinge on the activities of the original users. Occasionally, these programmes include compensation for possible loss.

The alternative approach based on the market, which is currently applied in a few countries,^{55,56} has the advantage of incentivizing voluntary resource

⁵⁵ S.M.A. Salman, and D. Bradlow (2006). *Regulatory frameworks for water resources management: a comparative study*. The International Bank for Reconstruction and Development. The World Bank.

⁵⁶ J. Bird, W.L. Arriens and D. Custodio, (2008). *Water Rights and Water Allocation: Issues and Challenges for the Asian Region*. Network of Asian River Basin Organizations. Asian Development Bank RSDD.

transfer from less productive users to those with greater productivity, while simultaneously generating, through payment, direct compensation to the affected parties. Due to its voluntary character, this approach also diminishes the possibility of conflict. On the other hand, for the solutions reached to be equitable, mechanisms that allow for control of the numerous externalities associated with this kind of transaction are required, as well as other conditions that are indispensable for the undistorted operation of a market (information, transparency, sufficient bidders and buyers, low transaction costs, etc.).

Whichever approach is chosen, water reallocation to meet new demands is a highly complex matter from technical, environmental, economic and social points of view. It is also very conflictive from the point of view of social equity, because of its impacts on direct users and because of the externalities it generates, which affect other users and even other sectors within the society.^{57, 58}

⁵⁷ R. Freeman (2005). *Can Water Allocation Buy Back Schemes Be Equitable for Impacted Communities?* OECD Workshop on Agriculture and Water: Sustainability, Markets and Policies. South Australia.

⁵⁸ N. Schofield, A. Burt and D. Connell (2003). *Environmental water allocation: principles, policies and practices*. Land and Water Australia.

6. EQUITY AND WATER-RELATED SERVICES: OBTAINING BENEFITS FROM WATER



In the last chapter we looked at equity in water allocations. In this chapter we will examine the factors that influence if and how people are able to derive benefit from those allocations.

As argued in Chapter 3, social equity is determined by the sum total of benefits from water resources, and their distribution, and not by equity in piecemeal aspects of water management.

Public policies and specific user-sector institutions (municipalities and agencies responsible for water supply and sanitation, irrigation, energy, natural disaster mitigation, etc.) directly influence access to benefits for water. Thus, to advance social equity and economic efficiency goals, countries need to promote appropriate sector policies that at the same time complement water resource policies and general economic and social policies. Section 3.1f and Figure 4 describe the interrelationships between these three components: water-related sector policies, water policies, and general economic and social policies.

To analyse the equity of policies that influence the use of water resources (or the control of their negative impacts), we will focus on three areas:

- services for providing water-related public goods,
- drinking water and sanitation services, and
- irrigation and agricultural services.

6.1 Services for providing water-related public goods

Water resources management generates a group of public goods that impact the everyday lives of a large proportion of humankind. These include amongst others: protection from floods; access to pollution-free streams, lakes and aquifers for scenic and recreational uses; use of ecosystems services; and navigation. These goods are particular in that they are within any citizen's reach, without the possibility of excluding anybody from their use or enjoyment. Also, in their use or enjoyment one does not generally reduce the possibility of their use and enjoyment by others (unless there is congestion).

World statistics on disasters show that hydrologically-related disasters (floods, droughts and landslides) and meteorologically-related disasters are the most common, accounting for 76.8% of all effective disasters in 2000–2008. In this period, the average number of victims per year from hydrological disasters alone was estimated to be 99.2 million.⁵⁹

Likewise, the pollution of water bodies is directly related to a long list of diseases that affect human health. Thus for example, the WHO estimates that each year 1.8 million people die from infectious diarrhoea, 160 million are infected by schistosomiasis, and 133 million suffer from intestinal infections caused by helminth worms.

Also, ecosystems, which are directly dependant on water for their functioning, such as wetlands in some areas, constitute an important source of food, fuel and fibre at local or national scales, and help sustain cultures and traditions.

As public goods benefit the community and not individual recipients, we tend to regard them as provided by the State – as can be seen both in the formulation and implementation of policies and programmes and in the financing of initiatives to provide such goods – and ignore the role that the community's commitment may play. This is not to suggest that all initiatives should be developed with public funds, since there are models for involving the private sector in financing. One example is application of the 'polluter-pays' principle, where those who generate the pollution must pay the costs of maintaining the environment. Another example is charges levied on owners who build on floodable terrain. Likewise, in some specific cases, cross subsidies are established from associated services that are profitable and generate income.⁶⁰

It is a paradox that, in the case of public goods to which all groups have free access, allocation of water and other resources to public goods has important consequences for social equity. Report after report has emphasized the importance of public goods for achieving the Millennium Development Goals, and, for overcoming poverty in general.⁶¹ Whereas in theory public goods are equally enjoyed by all, in practice their benefits – in particular protection from harm – are more important for some social groups than others.

⁵⁹ F. Vos, J. Rodriguez, R. Below and D. Guha-Sapir (2010). *Annual Disaster Statistical Review 2009: The Numbers and Trends*. Brussels: Centre for Research on the Epidemiology of Disasters (CRED), Université Catholique de Louvain.

⁶⁰ J. Rees, J. Winpenny and A. Hall (2008). *Water Financing and Governance*. TEC Background Paper No. 12. GWP.

⁶¹ Poverty-Environment Partnership (PEP) (2005). *Linking poverty reduction and water management*.

For example, poor rural areas are especially affected by floods as many different analyses have shown. In many regions, poor people in cities also tend to settle in more flood-prone areas. In addition, the poor are less able to recover from flood events because of their precarious material and economic conditions.^{62,63}

Similarly, pollution is a problem that disproportionately affects the poorer segments of society. The better off members of society are covered by drinking water and sanitation facilities, as well as enjoying better conditions in terms of health, nutrition, and other factors that make them less vulnerable to the effects of pollution.

The distribution of benefits obtained from State investment in public goods is also important to consider. For example, the benefits from flood protection may go to powerful riparian sectors that snatch the newly generated added value.⁶⁴

To achieve equity in the allocation of public goods requires that a number of issues are addressed:

- a) Adequate attention is paid to public goods within the context of State economic and social policies. For example, if there are no policies that address flood control, equity in relation to flood impacts is a moot point.
- b) The recognition of all the associated benefits/costs, from a holistic point of view.
- c) The recognition and consideration of initial inequality of different social groups and therefore different levels of benefits and access to benefits. In some cases, this may mean the application of subsidies on behalf of poorer sectors.

Next, we will briefly analyse each of these conditions.

a) Proper attention to public goods in the context of the State's economic-social policies

The provision of public goods depends on the State's action through its institutions, policies, and economic resources. Also, the public sector's low

⁶² I. B. Fox (2003). *Floods and the Poor Reducing the Vulnerability of the Poor to the Negative Impacts of Floods. Water for All. Series No. 11.* Asian Development Bank

⁶³ SAMTAC/GWP *South America Water Vision* (2000). Prepared for The Second World Water Forum. The Hague.

⁶⁴ In Chile, this kind of situation has led to important court trials between the State and private users.

performance directly affects the possible recipients of public goods, including among these the poorest segments of society.

Two conditions are relevant to equitable results:

- Integrated planning and implementation. The effective delivery of water-related public goods involves numerous sectors and sector-based institutions (environmental, territorial planning, sanitation, urban development, transport, etc.), often with their own types of laws and norms. Thus, equity depends on the capacity for integrated, long-term planning that addresses the many dimensions of the problems such as flood control and pollution, and the ability of the diverse State entities involved to implement plans in a coordinated way with communities is critical.
- The economic resources made available by the State to meet society's needs. In any decision on public funding there is an opportunity cost that may affect the ability of the State to meet other needs, such as transportation infrastructure, water supply and sanitation, or health. The trade-offs implied may also have an important social component. In this context, the incorporation of equity issues into government agendas depends on the criteria under which financing decisions and public expense allocation are understood. It is also part of the processes of each society's political decision-making procedure, which was analysed in Chapter 4. Coherent plans are needed with clearly identifiable benefits, especially those that affect the poorer segments of society. Mechanisms that ensure participation of these and representation of their interests are also critical for effective and equitable interventions. In practice, many times initiatives are developed as a response to critical situations that have a great deal of media attention, and consequentially, the press can play a very powerful role in determining the level of economic resources available for investment in public goods.

b) Recognition of benefits and losses associated with interventions and their impact on social equity

Benefits that are generated by public goods investments are frequently hard to value economically. In particular, indirect benefits/costs must be identified and assessed. A lack of a holistic vision in projects/investments may lead to inaccurate identification of costs and benefits, and eventually this may affect disadvantaged segments of society, which are generally less present in decision-making processes. Examples are flood-control projects that simply

displace risks downstream, or that do not consider the benefits derived from flooding such as fisheries, soil enrichment or irrigation.

There is also the danger of analysis that does not properly include equity goals. For example, the traditional cost–benefit methods used for assessing flood protection projects tend to prioritize wealthier sectors because their assets are more valuable and thus they could face greater economic losses from flood damage. Thus to properly consider equity, an integrated vision that takes into account all kinds of impacts and benefits (not only financial ones) within the decision-making process, and use of assessment instruments that explicitly incorporate equity and poverty-reduction goals, such as multi-criteria models, are necessary.

c) Equity in the distribution of financing burden

In the case of public goods where there are direct beneficiaries that can feasibly share the cost of financing, policies that focus subsidies on the ones who need it most will have more equitable results than those that include universal subsidies. Examples include development of flood protection insurance systems that include State subsidies for those unable to afford premiums, application of the polluter-pays principle to wealthier sectors, and subsidizing urban sanitation services for poorer segments of society.

Box 4 provides an example of policy recommendations that incorporate social equity concerns in flood management decision-making.

6.2 Equity in drinking water and sanitation services

As they are considered basic needs,⁶⁵ drinking water and sanitation services are often at the centre of public concern when it comes to water-related equity. Despite this concern, over one billion people still do not have reliable access to clean drinking water, and two billion do not have basic sanitation. The Millennium Development Goal target to halve the number of those without access to water supply and sanitation by 2015 is helping to speed progress, but many of the least developed countries are off track.

Domestic water demand generally enjoys priority status within water resources allocation frameworks as discussed in Chapter 4. The fact that a significant proportion of humankind suffers from a lack of access to water and sanitation services is not related to the ‘physical scarcity’ of water

⁶⁵ See for example, the United Nations’ Human Rights Commission, General Comment 15, as discussed in Chapter 3 of this paper.

Box 4: The Asian Development Bank's guiding principles for effective flood management

- The preservation of life and the protection of the welfare of households should be given the highest priority in the design of flood protection works; flood proofing and emergency evacuation measures should accompany all structural interventions.
- All stakeholders, including both administrators and the general population, which benefit economically, socially, and culturally from the water resources of a river basin, must have a say in how these resources are to be used and conserved. Both must also have a say in how floods should be managed to minimize their adverse impacts while also maximizing their beneficial impacts.
- Effective flood management requires a comprehensive approach that balances flood mitigation, environmental conservation, and sustainable utilization of available water resources for the benefit of all people of a nation.
- The conception and design of flood protection should be based on careful analysis of risk so that the passage of greater-than-design floods can be managed in a predictable and safe way.
- Capacity building of the organizations responsible for managing river basins and the raising of public awareness through better education are to be incorporated as effective means of reducing risks and loss of life from floods.
- Flood containment to a high standard of protection is recommended for urban and other densely populated areas where the potential for ever larger losses is increasing due to population growth and large investments in infrastructure and community services.
- To safeguard against catastrophic failure of flood control embankments, particular attention is to be given to construction quality and maintenance, and 'fuse plugs' or other means should be included to release excess water before floods reach unsafe levels.
- Many communities have developed traditional means of coping with frequent, low-intensity floods; and flood mitigation projects implemented by governments should incorporate these traditional means where possible to minimize the adverse impacts of floods.
- There is scope in many parts of Asia to make houses less vulnerable to floods, to provide shelters from storm surges and unusually deep floods, and to establish a network of evacuation roads for people and livestock. Similarly, in some parts of Asia, there is scope to use flood forecasting and warning systems. Where appropriate, such low-cost or low-impact flood mitigation measures should be adopted.
- There is also potential in parts of Asia to develop effective and affordable flood damage insurance for crops and property, and this should be used where suitable geographical and socio-economical conditions exist as a means of discouraging unreasonable levels of investment in flood-prone areas and of protecting the assets and livelihoods of persons living in these zones.

Source: I.B. Fox (2003). Floods and the Poor. Reducing the Vulnerability of the Poor to the Negative Impacts of Floods. Water for All Series No. 11. Asian Development Bank.

resources. Rather, it is related to ‘economic water scarcity’, in other words, the material capacity to provide the infrastructure, institutions and on-going investment needed to establish and maintain these services.

Various national, regional and worldwide forums have yielded different diagnoses of the lack of progress and policy proposals to better address the various dimensions of service provision – institutional, financial, administrative and technical. In the following paragraphs we offer an analysis of the factors, which are closely related to each other, that have the greatest influence on equitable access to services. These are:

- a) **The enabling environment** in which the water supply and sanitation sector is developed – the priority assigned by society to this issue, the institutional system, the sector’s governance, and the resources (human, financial) allocated to the sector.
- b) **The sector’s economic efficiency** (particularly in situations of economic scarcity) – the level of efficiency in the use of allocated resources to achieve service coverage goals.
- c) **Subsidy policies** – the distribution of public resources and resources from external sources that support the sector.
- d) **The regulatory system** – in particular the procedural mechanisms including laws and judicial processes, and economic incentives, designed to encourage an acceptable economic efficiency level and achievement of equity goals.

In the following sections, we analyse each of these factors in more detail.

a) **Enabling environment**

There is a growing level of social conscience regarding the lack of universal coverage for water and sanitation services, which in itself constitutes a huge inequity at global, national and local scales. The reality is that coverage is still largely determined by household income level, and consequently, poor sectors are often excluded.

From a global perspective, numerous reports show that there is direct correlation between per capita income in a country and their level of coverage. Per capita income is not the only factor, however, as countries

with well-organized economies and acceptable levels of governance offer a stronger enabling environment for the development of services.⁶⁶

In the pursuit of greater equity, the State's role is irreplaceable, especially in developing countries, for a number of reasons:

- Supplying the population with acceptable levels of drinking water and sanitation demands significant financial and organizational resources – resources that a great part of the population cannot afford to contribute to.
- The allocation of these services in economically efficient conditions generates natural monopolies, since in cities it is not economically feasible for multiple suppliers to provide drinking water services, which must be regulated.
- The provision of such services generates important positive externalities for the population as a whole, which must be considered at a State level.

The priority the State assigns to the provision of water and sanitation services, relative to other competitors for State resources, is therefore critical. In this sense, the political system's operation, including its capacity (and willingness) to take into account the priorities of the weakest segments of society, and its perception of the benefits of providing water and sanitation services, directly affect the pursuit of greater equity.

Notwithstanding the social reasons that justify investment of public funding in extending water and sanitation services to the poorest, the following economic and political factors also affect prioritization:

- **The magnitude of capital that must be invested in infrastructure with a slow rate of return.** The initial investment is very high and the benefits are received over the course of a long period. For example, in the USA, capital costs account for 90% of the overall costs of supplying water services.
- **Since everyone has some access to water, benefits come from improvements in the quality and level of accessibility, rather than access to water *per se*.**⁶⁷ Economic and productive benefits to the society as whole derive, for example, from a healthier work force (from

⁶⁶ M. Solanes, and G. Delacámara (2010). *Policies, structure and regulation in water and sanitation services*. In L.Heller (ed.) *Basic Sanitation, Environmental Health and Public Policies: New Paradigms for Latin America and the Caribbean*, Pan-American Health Organization (forthcoming).

⁶⁷ *Ibid*.

improved quality) and the increased time women devote to income-generating activities because of the reduced burden of fetching water and caring for the sick. In addition, improved water supply is correlated to an increase in education rates, particularly for girls. However, many of these benefits from improved quality and accessibility are indirect, are distributed among different types of beneficiaries, and are not expressed in financial terms.⁶⁸ As water is supplied at no cost from the environment and benefits are diffuse and difficult to quantify, users willingness to pay for water supply and sanitation is often low and users almost never pay the real costs.⁶⁹

- **Long time horizons which do not correspond to political cycles.** The policies that determine water supply planning and implementation and the resources available for such activities, must take a long-term perspective and transcend specific governments so that they can be maintained coherently throughout time. On the other hand, priorities are often determined by short-term exigencies.⁷⁰

b) Improving the sector's economic efficiency

In the context of the scarcity of financial resources that afflicts the water and sanitation supply sector in many countries, the economically efficient use of the allocated resources is an indispensable condition for the sector's social equity, since it directly affects the coverage and quality of the services. The consequence of any inefficiency ultimately falls on the weakest users, who will have to pay more directly to informal resellers, or indirectly by dedicating work hours to fetching water.

The sector's economic efficiency is related to:

- the incentive structure under which the suppliers operate (to be discussed in more detail in section d) below),
- the way in which economies of scale and of scope are employed within the sector,
- the local demand features, and
- the technical options.

⁶⁸ G. Hutton, L. Haller and J. Bartram (2007). "Global cost-benefit analysis of water supply and sanitation interventions". *Journal of Water and Health* 05.4. WHO.

⁶⁹ M. Hanemann (2009). *The Challenge of Water: Access, Sustainability, Competitiveness. Conference on Competitiveness and the Water Sector*, Mexico City, 2–4 September 2009. IMTA-USAID.

⁷⁰ M. Solanes, and G. Delacámara (2010). *Policies, structure and regulation in water and sanitation services*. In L. Heller (ed.) *Basic Sanitation, Environmental Health and Public Policies: New Paradigms for Latin America and the Caribbean*. Pan-American Health Organization (forthcoming).

In highly decentralized sanitation provision where there are no economies of scale and of scope, the cost per unit increases significantly when the number of connections in a system is too low. At the other extreme, the centralized provision of services through a national organization that provides them directly has frequently shown poor results, as a consequence of the lack of accountability and the 'bureaucratization' of systems.

In Latin America, some countries have traditionally placed the responsibility of water and sanitation services on municipalities. In the 1980s many countries, such as Argentina, Colombia and Peru, instituted massive responsibility transfers from central to municipal governments. These have in general not led to greater efficiency, but rather they have generated a number of problems.⁷¹ Many African countries are currently undergoing a similar decentralization process and are encountering many of the same pitfalls, such as failure to build the necessary capacity or transfer the necessary resources for municipalities to deliver water and sanitation services.

Ultimately, to achieve an efficient provision of services requires consideration of the appropriate scale to match the level of the demand,⁷² local features, existence of qualified personnel, etc. In Brazil and Bolivia there have been initiatives to reverse the excessive fragmentation caused by decentralization and to coordinate services at a municipality-group level (many municipalities together). In Chile they have developed a system based on regional companies.

Another factor that affects the efficiency of services has to do with the consideration of local conditions, since solutions are not necessarily the same in large cities and rural areas. Service provision alternatives can range from the centralized piped supply systems common in modern cities, to low-cost decentralized solutions managed by local community organizations. Even in two locations with similar features, the cost of providing services can vary greatly due to technical reasons.⁷³

⁷¹ A. Jouravlev (2004). *Drinking water supply and sanitation services on the threshold of the XXI century*. Serie Recursos Naturales e Infraestructura No. 74. CEPAL. Naciones Unidas. Santiago de Chile.

⁷² In Latin America it has been estimated that the minimum scale that is economically efficient for a water providing company is 100,000 inhabitants.

⁷³ For example, in each case of a country like Chile, the values between similar cities can differ by up to five times (*Sanitary System Management Report*; SISS, 2009).

c) Ensuring good use of subsidies

As has previously discussed, the provision of water and sanitation services is often impossible to finance by direct beneficiaries alone, so it must be financed with public resource inputs or by other beneficiaries through cross subsidies.

Cross subsidies in the water and sanitation sector can take different forms. Higher income customers may indirectly finance provision of services for poorer customers, for example by establishing preferential rates for consumption under a certain threshold. Another form of cross subsidy is when areas with lower service provision costs contribute to financing those that objectively have higher provision costs, for example, considering a unique rate regime for both areas. An institutional structure with providers at a regional level and not at a municipal level, offers greater possibilities for using cross subsidies as an instrument to incorporate greater equity into the system.

Nonetheless, subsidies financed with public resources are often unavoidable in situations where a high proportion of users have limited capacity to pay, as is the case in many developing countries. In this respect, it is of utmost importance that public inputs are used rationally and efficiently, and that they are effectively oriented toward expanding and improving the quality of services in poor sectors, as opposed to being captured by other social groups.

Policies oriented towards subsidizing the offer of services have frequently been criticized as socially inefficient since they benefit the consumption of high-income sectors. However, there are examples of subsidies designed to exclusively target users who need economic support, as established through some objective criteria. To guarantee this kind of targeted subsidy allocation requires adequate institutional support and a high-degree of public sector efficiency.⁷⁴ In any case, it is fundamental to rigorously analyse the design of subsidy systems and assess their efficacy from the point of view of equity. Likewise, procedures should be clear and transparent to verify that subsidies are received by those they are aimed at.

To reduce poverty, one of the biggest challenges is to reduce the gap between urban and rural coverage rates. In Latin America for example, urban coverage was 50% higher than rural coverage in the early 2000s. State policies and use of public funding are necessary to bridge this gap and improve overall equity by ensuring services to those in more unfavourable conditions,

⁷⁴ Examples of this type of subsidies in some developing countries can be seen in Colombia and Chile.

such as customers in remote areas. To ensure an efficient use of resources, policies with this objective must include the design of institutions, forms of participation for local communities, and technological plans and solutions that will best adapt to local conditions.

d) Developing an efficient regulatory system

The need to have greater autonomy in management and in order to establish better accountability, including checks and balances against inequities and injustice, has led many countries to separate the function of service provision from the function of regulation. In addition to the overarching need for a functioning judicial system, sectoral reform has also added to the social equity dimension of water resources management. Thus, for example, sector reforms carried out in the 1990s in Latin America have been known as: “from unregulated centralized public provision to regulated decentralized public provision.”⁷⁵

The monopoly features of the service provider, whether public or private, demands a regulatory system that offers incentives for efficient management, in terms of costs and service quality, and that prevents injustices that might arise from monopolistic control of such a precious resource.

From the perspective of social equity goals, the regulatory framework should incorporate rules that ensure transparency, competition, accessibility, the expansion of the service to new users, regardless of their consumption levels, as well as a stepped rate structure (tariff system) so that users pay more for greater levels of consumption.

On the other hand, the system should be designed so that, when there is no market mechanism, there are still incentives that encourage economic efficiency. The aforementioned internal incentives may be reinforced with external incentives such as legal requirements, including regulatory reporting obligations, benchmarking processes and communication of the results to the public to improve accountability and transparency.

Also, the regulating organism has a group of challenges, whether it is a public or private agency:⁷⁶

⁷⁵ V. Foster(2005). *Ten Years of Water Service Reform In Latin-America: Toward an Anglo-French Model*. Water Supply and Sanitation Board Discussion Paper Series No. 3. World Bank.

⁷⁶ M. Solanes, and G. Delacámara (2010). *Policies, structure and regulation in water and sanitation services*. In L. Heller (ed.) *Basic Sanitation, Environmental Health and Public Policies: New Paradigms for Latin America and the Caribbean*, Pan-American Health Organization (forthcoming).

- Ensuring that the benefits of increased efficiency are transferred (accordingly to set rules) to consumers.
- Ensuring that the service quality is adjusted to meet accepted standards.
- Preventing the costs of inefficiencies to be transferred to the government or users.
- Verifying that costs are realistic, in order to avoid the distortion of operational benefits.
- Full life-cycle costing, which includes costs for post-construction support, operations, and maintenance and capital expenditure, while at the same time avoiding overinvestment.
- Ensuring transparency, curtailing corruption and pork barrelling.

These tasks suppose the operation of regulating institutions that have the professional and technical capacities needed, as well as the resources to guard the public interest. This goal cannot be fulfilled without strong political commitment to the configuration of the regulating entity, plus sufficient time for its development.

To ensure adequate protection for the users' interests, it is also necessary to develop mechanisms for participation. Nevertheless, in many countries the instruments necessary for effective participation, such as mechanisms to inform/educate users and ensure participation by those with the least power, are very limited and consumer interests are not well represented.⁷⁷

6.3 Equity in irrigation services

Irrigated agriculture, with 70% of all water extractions, constitutes the main use of developed freshwater supplies. The allocation and regulation of water extractions for irrigation was discussed in Chapter 5. In this section we will look at the conduction and distribution of irrigation water, activities that lead to adding water to plants, and agricultural production and marketing in general, all of which forms a group of services that contribute to obtaining water benefits.

Small-scale farmers make up the bulk of world's poorest people and roughly half of the undernourished. There is a demonstrated correlation between reductions in poverty and access to water for irrigation. Research has also shown that the growth of agriculture is the main reason for the decline of poverty in numerous developing countries, and its impact on poverty is

⁷⁷ Ibid.

greater than that of other sectors of economy.^{78,79} Thus in Chile for example, the expansion of the agricultural sector has had a substantially larger impact on the decrease of poverty than expansion of other sectors.⁸⁰

As irrigated areas account for 40% of the world's food supply, the availability of irrigation water also indirectly impacts supply levels and the prices of food at a global level.

Considering that the productivity of irrigated land more than doubles that of rain-fed areas many countries began developing initiatives in the early 1900s to increase irrigated areas as a way to improve their economic development and combat poverty. The result is that in the last 50 years irrigated areas worldwide have doubled. This trend is expected to continue, since to reach worldwide food security some expansion of irrigated area will be needed, although expansion rates are likely to be much less than in the past.⁸¹

Irrigated areas are important for the goal of overcoming poverty not only from the perspective of food consumers, but also from the perspectives of those living in food producing regions. There are numerous reports that support the conclusion that irrigation has a generally positive impact on the process of overcoming poverty and achieving social equity.⁸² For example, Figure 6 shows the tight relationship between irrigated area and per capita income in different districts of India.⁸³

However, the ways in which irrigated agriculture contributes to social equity are especially complex and hard to quantify. For the purposes of this report we will analyse some central elements that we believe condition the social

⁷⁸ J. Mellor (2001). *Irrigation, Agriculture and Poverty Reduction: General Relationships and Specific Needs*. In *Managing Water for the Poor*. IWMI, Colombo, Sri Lanka.

⁷⁹ The increase of agricultural production presents an impact on the reduction of variable rural poverty, depending on the economic and social features each country presents. Thus, for example, the elasticity of rural poverty compared to the average productivity of the agroforestry sector in China is six times that of Latin America. (A. Betancor, 2008). *Pobreza rural en Chile: Evolución y determinantes*. RIMISP).

⁸⁰ R.López and G. Anríquez. (2005). *Pobreza y Crecimiento Agrícola*. En: *Externalidades de la Agricultura Chilena*. Universidad Católica – FAO.

⁸¹ M.W. Rosegrant, C. Ringler and T. Zhu (2009). *Water for Agriculture: Maintaining Food Security under Growing Scarcity*. Environment and Production Technology Division, International Food Policy Research Institute. Annual Review of Environmental Resources.

⁸² "Comprehensive Assessment of Water Management in Agriculture 2007". *Water for Food, Water for Life: A Comprehensive Assessment of Water Management in Agriculture*. London: Earthscan, and Colombo: International Water Management Institute.

⁸³ *World Bank Water Resources, Growth and Development*. A Working Paper for Discussion Prepared by The World Bank for the Panel of Finance Ministers The UN Commission on Sustainable Development, 18 April 2005.

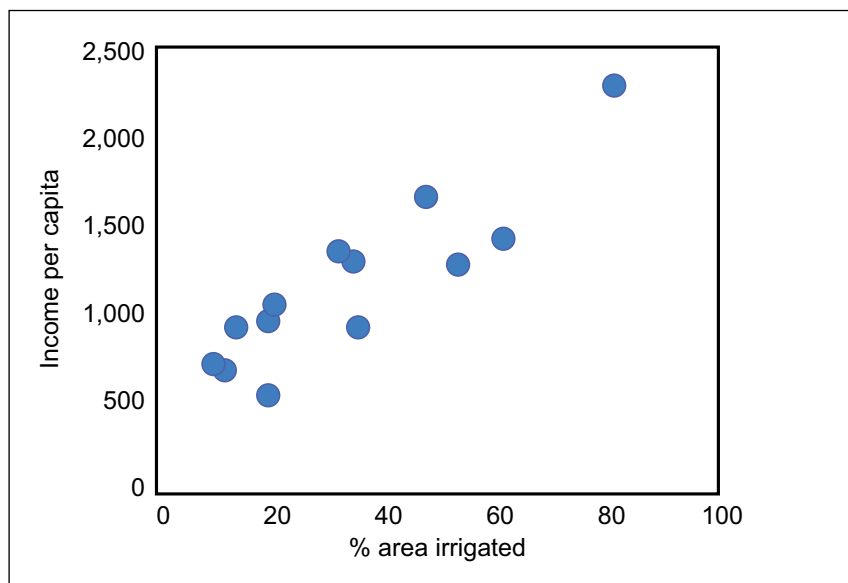


Figure 6. Average income levels & irrigation intensity in India. Source: World Bank (2005). *Water Resources, Growth and Development, A Working Paper for Discussion Prepared by The World Bank for the Panel of Finance Ministers, The UN Commission on Sustainable Development 18 April 2005.*

equity impacts of a particular irrigation policy. The following conditions are critical for irrigation activities to have a positive impact on social equity:

- a) Irrigation projects and programmes must be economically and socially beneficial.
- b) Programmes must be designed to promote greater social equity.
- c) Management of the irrigation systems must be equitable.

Next, we will expand on each of these subjects.

a) Irrigation projects and programmes must be economically and socially beneficial

Access or lack of access to irrigation is a source of inequity in itself.

Numerous studies show that irrigated areas have less poverty than non-irrigated areas. Agricultural productivity is generally greater in irrigated areas – adding irrigation water can increase yields many times over – although climate and soil type also play a role. In addition, farmers are able to grow higher value crops such as fruits and vegetables, which demand a more reliable water supply. However, the income derived from irrigation also depends on access to markets and inputs.

Many governments have invested in developing large-scale irrigation projects both for economic and social reasons. Although in general these projects have been judged successful,⁸⁴ some ambitious and expensive projects ended up delivering results far below expectations.⁸⁵ Benefits and costs for irrigation initiatives must be carefully evaluated, so as to ensure that there is an effective contribution to development goals and equity.

Regardless, from a poverty reduction perspective there are good reasons to invest in irrigation, provided that projects are socially, economically, and environmentally sound. According to the World Bank, each job in the irrigation sector has an average cost of between US\$5,000 and US\$6,000, which compares favourably to US\$44,000, which is the average cost of creating jobs in other sectors.⁸⁶ In Africa and Latin America the possibilities for increasing irrigated areas are relatively large.⁸⁷

Adequate evaluation of all the costs

From the perspective of costs, adequate assessment implies among other aspects, a realistic foresight of the magnitude of the costs of infrastructure and related programming, and the amount of time required for the delivery of benefits. These have frequently been underestimated in large projects, as have the difficulties associated with the complexity of this kind of intervention.⁸⁸

It is also necessary to adequately consider the components beyond irrigation that are necessary for benefits to be effectively realized, such as training, development of complementary infrastructure such as roads, incorporation of technology, financial services, etc. In addition, the social and environmental costs associated with the activity of irrigation need to be considered and mitigated, such as population displacement, soil salinization, flooding of low lying areas caused by the rise of groundwater levels, and negative impacts on

⁸⁴ It is estimated that about 67% of irrigation projects financed by The World Bank within the 1961-1987 period were satisfactory (Jones 1995), in Chapter 9 Reinventing irrigation. Comprehensive Assessment of Water Management in Agriculture.2007

⁸⁵ For example, the experience in Africa has seen some successes and many failures, and investments have generally ended up being economically unsound. Cleaver K. "Rural development strategies for Poverty reduction and environmental protection in Africa." In *Rural well-being: From vision to action*. Environmentally and Socially sustainable development proceedings series 15. World Bank. 1996

⁸⁶ D. Molden and Ch. de Fraiture (2004). *Investing in Water for Food, Ecosystems and Livelihoods. Comprehensive Assessment of Water Management in Agriculture*. Blue Paper. Discussion Draft. Stockholm.

⁸⁷ In Africa, it has been pointed out that with costs of US\$ 6,000 per hectare for new irrigation zones, projects are profitable with a profitability index over investment of 10% or more. In *Beyond More Crop per Drop*. F. Rijsberman and N. Manning. 4th World Water Forum. 2006. México.

⁸⁸ World Commission on Dams.(2000). *Dams and Development. A New Framework for Decision-Making*. The Report of World Commission on Dams.

downstream ecosystems, which people may depend on for their livelihoods, due to water withdrawals and contamination by agrochemicals.⁸⁹

Adequate evaluation of all the benefits and all the beneficiaries

From the perspective of benefits it is important to stress the fact that besides the direct benefits from increased productivity, irrigation development brings a wide array of indirect benefits, which are usually many times greater than the direct ones.

In this respect, it is important to recognize that agriculture is an integral part of the rural economy and has a huge impact on the non-agricultural rural sector. In Chile for example, the agricultural sector's GDP increases 2.5 times if we consider the productive chains – both forward and backward – of irrigated agriculture that are associated with commerce, services, and agro-industry.⁹⁰ In Latin America in the 1990s, non-agricultural rural income was estimated to be around 40% of total rural income.⁹¹ Also, it is necessary to consider that the non-agricultural rural sector is very dynamic and sensitive to agricultural transformation.⁹² This means that the productive effects of irrigation are considerably increased. Research has found the multiplier effect of irrigation to be generally in the range of 2.5 to 4, up to 6 in Australia, and between 1.22 and 3.15 in India.⁹³

The beneficiaries of irrigation can vary greatly. Among them are large or medium landowners, landless agricultural workers, agro-industrial services, and owners and workers in related services such as commerce, transportation, specialized services, etc. In addition, bringing a reliable water supply to an area can have advantages for non-agricultural water users, who may benefit from groundwater recharge, fishing opportunities, or, in areas without domestic water service, direct use of irrigation water for household purposes.

⁸⁹ D. Molden, K. Frenken, R. Barker, Ch. de Fraiture, B. Mati, M. Svendsen, C. Sadoff and C.M. Finlayson (2007). *Trends in water and agricultural development*. Chapter 2. In *Comprehensive Assessment of Water Management in Agriculture*.

⁹⁰ A. Valdés and W Foster (2005). *¿Tiene externalidades positivas la agricultura Chilena?*. En *Externalidades de la Agricultura Chilena*. Universidad Católica – FAO.

⁹¹ E. Klein (2009). *Condicionantes laborales de la pobreza rural en América latina*. Oficina Regional de la FAO para América Latina y el Caribe. FAO.

⁹² In Chile, between the years 1990 and 2000, along with the growth of the agricultural GDP in irrigation agriculture, we can see systematic growth in income for rural non-agricultural jobs, associated with commerce, industry, and services, going from 30% to 45% of rural income. (E. Ramírez. *Análisis de la Movilidad del Empleo Rural en Chile 1996 – 2001*. Debates y temas rurales n°3. RIMISP. Centro Latinoamericano para el Desarrollo Rural).

⁹³ D. Molden, K. Frenken, R. Barker, Ch. de Fraiture, B. Mati, M. Svendsen, C. Sadoff and C.M. Finlayson (2007). *Trends in water and agricultural development*. Chapter 2. In *Comprehensive Assessment of Water Management in Agriculture*.

In South Asia, irrigated areas generate more than double the employment than non-irrigated areas, and research in a Bangladesh irrigation system concluded that work days increased in irrigated areas by 100 days per hectare.⁹⁴ In Chile, research has shown that irrigation safety improvement projects and irrigated area expansion projects generate anywhere between two and three times more direct permanent jobs than there were before.

b) Programmes and projects oriented toward equity

In general, the State's role in the development of irrigation is extremely important, since these are usually projects that:

- demand a high degree of coordination between numerous groups of possible beneficiaries,
- require large investments with returns spread out over a long time period, and
- they are characterized by strong economies of scale and positive externalities that extend beyond direct users.

This is why private initiatives are sufficient only for projects with very advantageous economic conditions, i.e. high private profitability and small investments. These may materialize autonomously and do not require coordination between many users, (e.g. the drilling groundwater wells). The State's role becomes even more decisive when irrigation projects are justified as an instrument for regional development and the fight against poverty.

In addition to the State's programme management role in highly complex initiatives, the State frequently contributes to financing irrigation works and even their maintenance and operation. This financial participation is justified in terms of positive externalities, which are not received by direct users, but are in the best interest of regional development and have associated social benefits.

From the perspective of equity, programmes must be prioritized considering their social benefits and not just their productive benefits, and public inputs for social goals must affectively reach the destined population. Developing assessment criteria with indicators that measure the effective reduction in poverty and applying multi-criteria models that expressly prioritize equity goals should be the course of action.

⁹⁴ I. Hussain (2005). *Pro-poor Intervention Strategies in Irrigated Agriculture in Asia. Poverty in Irrigated Agriculture: Issues, Lessons, Options and Guidelines Bangladesh, China, India, Indonesia, Pakistan and Vietnam*. Project Final Synthesis Report. Colombo, Sri Lanka: International Water Management Institute.

Box 5: Lessons in promoting irrigation from Chile

Experiences promoting irrigation via small and medium irrigation projects in Chile illustrate the way in which initial inequalities can skew the benefits of public investments in irrigation. The programme allowed partial financing with State funds (up to 75% of the irrigation works' value) for small and medium irrigation works. Private citizens could apply for the funds through State-called tenders.

In its original design between 1986 and 1993, the programme offered equal competition for access to the funds. As a result, only 4.6% of State subsidies went to poor farmers who constituted 6.4% of the beneficiaries, and the rest was used by 'entrepreneurial agriculture' characterized as industrial, export-oriented, and utilizing high technology.⁹⁵ This situation led to the reformulation of the programme and the creation of a system of differentiated competition for poor, rural farmers and 'entrepreneurial agriculture', with a specific fund for each sector. A complementary support programme for the identification and research of projects was also established.

Notwithstanding the new programme's indisputable success in improving poor farmers' incomes, the uneven distribution of the other factors that influence the productivity and profitability of agriculture (capital, commercialization, technology, etc.) resulted in the outcome of both groups being quite different. Thus, research showed that in the 'entrepreneurial agriculture' sector, there was 45% more investment of self-owned resources in irrigation works and complimentary activities, and that the companies direct income increased 2.4-fold, whereas that of poor farmers' income increased only 1.6 times.

To deliver targeted benefits also requires the active inclusion of the affected/benefited population, as described in Chapter 4. For resources to effectively benefit the weakest, it is fundamental to recognize the initial conditions, in all their complexity, of all possible direct beneficiaries, since those conditions are dramatically unequal in developing countries. If we do not correct the consequences of these initial inequalities, the public inputs that are allocated to achieve social objectives end up favouring more powerful sectors. Thus, in initially unequal situations, it is necessary to develop programmes with differentiated conditions so that the results are fair. This should be done without overlooking the fact that the income for the wealthier sectors is in fact oriented towards local spending, and may also effectively contribute to poverty reduction.⁹⁶

⁹⁵ J. Hendriks (2008). *El agua como propiedad privada. Apuntes sobre la problemática de agua en Chile*. En *Buscando la Equidad* editado por R. Boelens y G. Dávila (1998) Van Gorcum.

⁹⁶ J. Mellor (2001). *Irrigation, Agriculture and Poverty Reduction: General Relationships and Specific Needs*. In *Managing Water for the Poor*. IWMI, Colombo, Sri Lanka.

Inequitable conditions are related to land and water distribution, infrastructure availability (roads, communications, etc.), technical capacities, capital availability, and access to a wide array of services that are associated to the agricultural activity (loans, commercialization, information), amongst others.

Although benefits from increased agricultural productivity are mainly received by landowners, impacts on employment of non-landowners and on the job market in general constitute the main contribution irrigation programmes make to the fight against poverty.⁹⁷ For irrigation plans to be effective from an equity point of view, it is important that they are conceived in a holistic manner as part of rural development, with special attention to the disadvantaged conditions of the weaker sectors. In this context, the requirements for complementary infrastructure (roads, communications, etc.) must be tended to, as well as the development of capacities, works for technological transference, the development of services that are related to agricultural support, and the promotion of related activity development in general such as agro-industry, commerce, tourism, etc., that allow the maximization of benefits from such programmes.⁹⁸

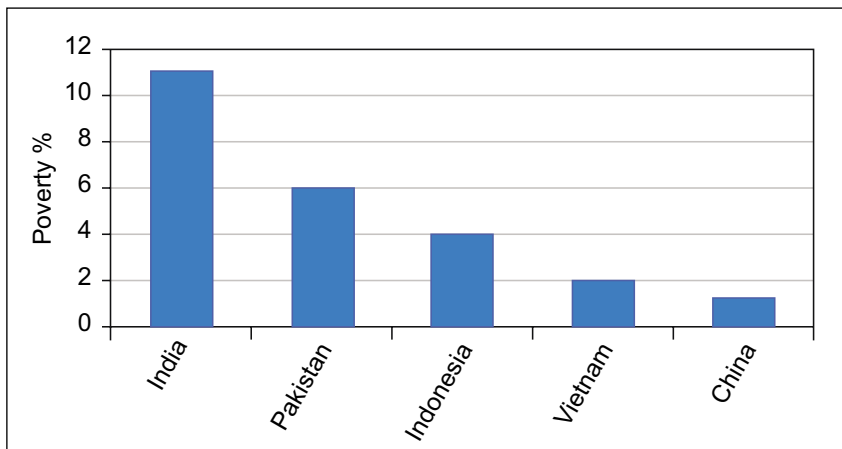


Figure 7. Differences in poverty incidence upstream and downstream in five Asian countries. Source: Hussain, I. (2005). *Pro-poor Intervention Strategies in Irrigated Agriculture in Asia. Poverty in Irrigated Agriculture: Issues, Lessons, Options and Guidelines Bangladesh, China, India, Indonesia, Pakistan and Vietnam. Project Final Synthesis Report*. Colombo, Sri Lanka: International Water Management Institute.

⁹⁷ J. Mellor (2001). *Irrigation, Agriculture and Poverty Reduction: General Relationships and Specific Needs*. In *Managing Water for the Poor*. IWMI, Colombo, Sri Lanka.

⁹⁸ I. Hussain (2005). *Pro-poor Intervention Strategies in Irrigated Agriculture in Asia. Poverty in Irrigated Agriculture: Issues, Lessons, Options and Guidelines Bangladesh, China, India, Indonesia, Pakistan and Vietnam*. Project Final Synthesis Report. Colombo, Sri Lanka: International Water Management Institute.

c) Equity in irrigation system management

The need for specific attention to issues of equity is pertinent within the different phases of irrigation activities, including among them, the management and operation of irrigation systems. When irrigation system management is deficient and irrigation services are of low-quality, poverty and inequality levels tend to be higher, as demonstrated by research in South Asia. In poorly managed and maintained irrigation systems, poverty levels in areas located near intake zones are lower than those located in the tail ends of distribution systems. This is illustrated in Figure 7, which shows the difference between poverty levels upstream and downstream in different South Asian countries. It also shows that this difference is less in China, where systems are better managed and characterized by a more equitable land distribution.

One of the main causes of low-quality service is inadequate financing. If tariffs are too low to support sustainable operations and maintenance, instead of favouring poorer sectors, such a system may contribute to greater inequality.

Sometimes, low-quality service in irrigation systems is caused by overly bureaucratic management systems or diverse forms of corruption.⁹⁹ The relationship between irrigation management and political systems can in some cases strongly distort management, contributing to opportunity inequality.¹⁰⁰

In irrigation systems we can also see discrimination problems that are to some extent inherent to each society and affect ethnic or cultural minorities as well as women. This limits those groups' access to irrigation and irrigation-related services.¹⁰¹

In this respect, it is important to point out that users' perceptions of the definition of equity in an irrigation system are broad and not necessarily limited to the concept of access to water. In the case of traditional Andean irrigation systems, this perception also includes services that are related

¹⁰⁰ P. Mollinga (1998) *Equidad y la obligación de rendir cuentas. La distribución del agua en un sistema de riego en el sur de la India*. En *Buscando la Equidad* editado por R. Boelens y G. Dávila. Van Gorcum.

¹⁰¹ I. Hussain (2005). *Pro-poor Intervention Strategies in Irrigated Agriculture in Asia. Poverty in Irrigated Agriculture: Issues, Lessons, Options and Guidelines Bangladesh, China, India, Indonesia, Pakistan and Vietnam*. Project Final Synthesis Report. Colombo, Sri Lanka: International Water Management Institute.

to irrigation development; complementary agricultural production in communal lands; collective commercialization, obligations, functions, and burdens (for example, rotary positions, differentiated tariffs, work obligations, etc.); the balance between rights and obligations in irrigation; and the rights to partake in the decision-making process.¹⁰²

¹⁰² R. Boelens and G. Dávila (1998). *Reflexiones*. En *Buscando la Equidad* editado por R. Boelens y G. Dávila. Van Gorcum.

7. FINAL REMARKS



he subject of social equity as it relates to water management is extremely broad. It involves multiple management levels and different areas of activity. It is also a very complex issue, with roots in economic, cultural, historical, political and many other aspects that characterize every society. Sometimes, inequities are glaring and spur protest at national or global level, but others remain hidden and silent in the numerous decisions that are taken in relation to water management, daily.

So, the relationship between water management and social equity – including their causes, dynamics and consequences – should be analysed in the local context, just as the possible solutions must be firmly grounded in the local context. The intention of this paper is to aid the work of those who have the responsibility to promote water policies according to each reality.

This analysis of equity and water management from an integrated water resources management (IWRM) perspective yields two central conclusions.

- To analyse a particular water policy from the perspective of social equity, one must take a holistic view in very different dimensions.
- In water management, the goals of social equity and economic efficiency are usually objectives that potentiate each other. Well-conceived policies allow for simultaneous progress on both goals.

In reference to the need for a holistic view, the paper presented a number of key points:

- The goal of social equity in relation to water should be viewed in the context of society's goals, and not as an objective that is dealt with just within the hydrological sector. In this sense, water management is a means to an end, and equitable water management is a means of improving equity within society as a whole.
- The goal of social equity must be considered within processes as well as in the distribution of the final benefits associated with water. This means that in order for a particular policy to be considered equitable, the interests of different groups must be represented, and problems of asymmetries of power, information, corruption, or discrimination must be addressed.

- In order to determine if a particular policy or institutional arrangement pertinent to water is equitable and meets social equity requirements, it is necessary to consider all benefits and all users associated with the water resource. This should be regardless of whether they are direct or indirect users, and regardless of their form of accessing the benefits. The process of determining social equity is usually achieved through legal mechanisms, which requires a functional judicial system that facilitates access by all and that provides for considerations of equity. This is provided for in the majority of domestic national legal systems and at the international level.
- The social equity of water policies should be assessed based on their final outcomes, and thus must be considered along with those sector policies and general State policies that affect the magnitude and distribution of water benefits. Analysis should also include both the management of water as a resource and the allocation of related services that allow for the procurement of water benefits.

As for the relationship between the goal of social equity and the goal of economic efficiency, the following points should be kept in mind:

- In the case of drinking water supply, sanitation and irrigation, greater economic efficiency in service supply, which reduces prices, may constitute an efficient mechanism for the improvement or the expansion of service to poorer segments of the population.
- In general, it is possible to develop water policies that, in combination with sector policies, lead to solutions that are socially equitable and also economically efficient. This is the case of well-conceived irrigation policies that are oriented toward equity and that use different instruments for increasing productivity in the slowest economic sectors. This type of multi-focus approach is particularly important where water availability constitutes a strong obstacle for the fulfilment of national goals of food and energy security.
- There are certain types of water resources development that are characterized by extremely high productivity per cubic metre of water but that require large investments – be they public or private. If this type of development is environmentally sustainable as well as socially and economically beneficial, social equity and economic efficiency will be achieved as long as the State's general framework allows for a correct allocation of benefits as well as the control or reparation of costs.

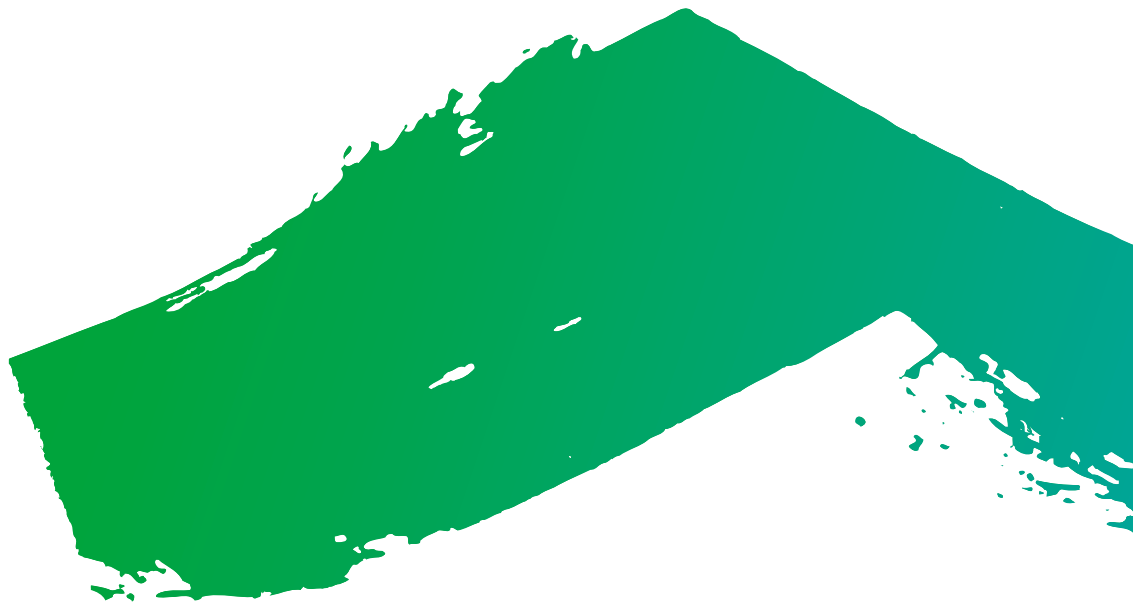
Global Water Partnership, (GWP), established in 1996, is an international network open to all organisations involved in water resources management: developed and developing country government institutions, agencies of the United Nations, bi- and multilateral development banks, professional associations, research institutions, non-governmental organisations, and the private sector. GWP was created to foster Integrated Water Resources Management (IWRM), which aims to ensure the co-ordinated development and management of water, land, and related resources by maximising economic and social welfare without compromising the sustainability of vital environmental systems.

GWP promotes IWRM by creating fora at global, regional, and national levels, designed to support stakeholders in the practical implementation of IWRM. The Partnership's governance includes the Technical Committee (TEC), a group of internationally recognised professionals and scientists skilled in the different aspects of water management. This committee, whose members come from different regions of the world, provides technical support and advice to the other governance arms and to the Partnership as a whole. The Technical Committee has been charged with developing an analytical framework of the water sector and proposing actions that will promote sustainable water resources management. The Technical Committee maintains an open channel with the GWP Regional Water Partnerships (RWPs) around the world to facilitate application of IWRM regionally and nationally.

Worldwide adoption and application of IWRM requires changing the way business is conducted by the international water resources community, particularly the way investments are made. To effect changes of this nature and scope, new ways to address the global, regional, and conceptual aspects and agendas of implementing actions are required.

This series, published by the GWP Global Secretariat in Stockholm, has been created to disseminate the papers written and commissioned by the Technical Committee to address the conceptual agenda. See the inside back cover for a list of publications in this series.

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