



CONFLICT OVER COMMON PROPERTY RESOURCES (CPRS)- GLOBAL STRATEGIES OF WATER MANAGEMENT

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ABSTRACT

In the present world, proper management of common property resources (CPRs) are crucial, since CPRs are present on the earth in abundance and people tend to over-exploit for their economic and political interests. Particularly in the case of transboundary CPRs such as water, unsustainable and political interests based utilization results in disputes among riparians. Therefore, proper management is required for sustainability of transboundary water resources for its dependant countries. In this context the paper reviews various existing treaties and agreements as strategies for conflict resolution and water management at global level. The paper also provides suggestions for better water management.

Key Words- CPRs, Transboundary Waters, Riparian, Water Management

Introduction

Common property resources (CPRs) are generally those natural resources which are managed and used by a community, state or a region. A common property resource typically consists of a core resource (e.g. water, pastures, forest or fish etc.), that defines the variable stock, while providing a limited quantity of extractable fringe units, also defined as the flow variable. As CPRs are depletable resources, they face problems of congestion or overexploitation and consequently their proper management is required to use the resource in sustainable way.

It is evident that globally water scarcity is one of the problems related to CPR; as water is a necessary and fundamental resource. However, fresh water is essential for human being and for their economic development. As the global population is growing, the demand for fresh water is increasing which is demanding more drinking water, for production of food, sanitation, and hydro-power generation and fibre crops etc. Developmental activities, which include rapid industrialization and urbanization, building dams have been increasing; at the same time poor management and deficient planning of such activities will led to the scarcity of water and consequently may led to conflicts between and within countries, in particular case of transboundary rivers. The unequal water supply and ineffective distribution system in the Transboundary Rivers will have paramount importance for addressing water scarcity. Such issues can induce tensions among countries, using transboundary water resource as common property resource with the threats of violent conflict. Therefore, the article deals with the common property resources in general and transboundary water resource in particular. It also tries to explore the importance of adequate international strategies to deal with conflicts that arise from transboundary water resources and their management.

Common Property Resources

The ‘Common Property Resource’ (CPR) term was primarily used by Elinor Ostrom in 1980s. ‘CPRs’ are natural resources that are owned or held and managed by a community or society collectively, rather than by individual (OECD, 1997). A Common Property Resource is a type of good that consists of a natural and artificial resource system such as an irrigation system, forest and fishing grounds, which are costly by its size or characteristics, but not impossible to exclude potential beneficiaries from obtaining benefits from its use. (Ostrom, 1990). No individual or group of individuals can provide public goods because it requires huge funds, yet they are having great benefits and are often essential for social well-being of the masses. Many environmental public goods, like forest and wetlands preservation, cannot be adequately supplied by the market. The intervention of the government and public funds are required to gain the social benefits that flow from providing these public goods.

A major concern is that the common property resources are subjected to its overuse, which leads to economic problems such as the tragedy of the commons, where self interest of the user leads to the destruction of the resources in long term; to the disadvantage of everyone, especially when there is poor management of the water and the colonial treaties by which the hegemony of certain states leads to the conflicts. Common property resources that are not

owned by anyone are called open-access resources (Ostrom, 1990; Wade, 1987). International cooperation is required to ensure that the mutual benefits of common property resources are maximized.

Water as a Common Property Resource

As mentioned above CPRs are such natural resource that has no boundary and territory and not owned by any country or any person. Keeping this in mind, water is the largest and the most important Common Property Resource in the world. Human beings and almost all other terrestrial life, depends on the availability of water resources. However water's global distribution is highly uneven. Water is also limited by its accessibility and suitability. Of the Earth's total volume of about 1386 million km³, some 96.5 percent is saline ocean water, which is not suitable for human consumption. Of the remaining 3.5 percent, 35 million km³ is fresh, out of which 24 million km³ is stored in ice sheets and glaciers and 10.5 million km³ is groundwater resources. Fresh water in lakes totals to 91000 km³ and in rivers 2120 km³ (Shiklomanov and Rodda, 2003). The average annual precipitation on the earth surface is about 800 millimeters (Chow *et al.*, 1988). The hydrological cycle distributes water unevenly around the world and can be divided into water surplus and water deficit regions. In general most of Africa, much of Middle East, the western United States north-western Mexico, part of Chile and Argentina, and major parts of Australia are water deficit regions (World Resource Institute, 1986).

Globally about 9000 km³ water is available for human consumption, which is enough to sustain 20 billion people; but the population of the world and usable water both are unevenly distributed. Much of the Northern Africa, Middle East, parts of Central America and many other countries are experiencing extreme scarcity of water due to increasing demands to satisfy their agricultural, industrial and domestic requirements (La-Riviere, 1989). Additionally, water is an ambient resource all over the globe that does not respect the political boundaries between countries; therefore it has become a decisive transboundary resource as well. A transboundary waterway is defined as all territory from where a stream or at least one of the tributary contributes or crosses a boundary. Around 50 percent of the Earth's land surface; excluding Antarctica and 60 percent of the world's fresh water falls within transboundary basins. Transboundary water resources are very difficult to manage, since national interests of different countries are involved, so managing transboundary waters often brings disputes and conflicts among sharing countries. Therefore, being a transnational

Common Property Resource in nature, water resource has global concerns over its possession and utilization and for better management political stability and political arrangements are necessary to fully harness the water as common property resource.

Water Management and Regional Instability

It is seen in various transboundary water regions that national interest of riparian countries clashes with each-other and results in disputes and regional instability. The main reason for dispute and regional instability is related to uneven distribution of water resources and continuously increasing water demand due to rapid population growth. The usable freshwater is finite and the amount of freshwater on Earth is non-changeable, yet water use went up nine-fold in the 20th century (McNeill, 2003:5-43). At the same time, for many river basins and aquifers the availability and access to clean and safe water are declining because of pollution and overexploitation. Apart from these, additional threats to water availability include expanding irrigated agriculture, industrialization, and urbanization in combination with climate change.

These water crises can be illustrated by taking example from four different regions of the world; those are having a different history of water issues. The first region is South Asia that describes basins without a permanent water-sharing agreement. The second region is the Nile River basin that has been charged with a disputed colonial allocation of water resources awarded majorly to one of the eleven riparian. The third one is the Middle East that has two basins in crisis (Euphrates and Tigris), one with a dominating riparian and another where one riparian gained full control of the resources through prolonged military actions. The fourth region highlights the new phenomenon; the wealthy countries which are short of water securing long-term arrangements for agricultural production to serve their food insecurity (Frederiksen, 2009). Therefore, recognizing the seriousness of the disputes and its impact on regional development of particular river basins, it is significant to maximize and equalize benefits from water recourses in a sustainable manner through cooperative water management. For this the required steps comprises the cognizance of the relations in local policy and decision maker and local population of the riparian countries and regions; the presence of reciprocal consent and fair treaties and agreements; and the establishing a cooperative mechanisms and institutions.

One of the major objectives of water resource management is to persistently harmonize vying concerns of the international basin's water user; it may be individual people, interest groups,

corporations and administrative or sovereign entities. The management of disputes related to water conflicts or different opinions; cooperation is therefore most important component of water resources management in its widest sense. This might range from managing quite and mutual practice between exploiters of water to alleviating and easing dialogues of conflicts between countries. The plan might be considered with the thought that even though distributed common water resources might be a root of dispute and violent conflict, their cooperative management should be reinforced and eased to encourage joint action among the users of water resource.

International law related to transboundary water resource utilization is another important way for transboundary water management, which furnishes a number of ways to adjudicate international conflicts and disputes, both diplomatic and legal in which diplomatic means include negotiations, mediation, consultation, investigation and inquiry, conciliation and the use of cooperative institutions and legal means include settlement and arbitration. Generally, water conflicts are resolved by dialogues and talks with a final result as an agreement or treaty. International laws furnish a broader demonstration of the legal projects which is formed by countries and their models are easily approachable and generally more accurate. Often the laws are able to address highly technical issues e.g. high quality and quantity standards of water, permissible level of emission and norms of water abstraction etc. Usually multilateral treaties are referred as international conventions and generally followed by convoked multilateral meetings and conferences under UN specialized sub-organizations.

Importance of Water Management Strategies- Uses of International Water Courses at Global Level

Water Management is a complex and challenging procedure especially as CPR and in transboundary regions. Transboundary Water has a number of economic and ecosystem requirements, though in some cases, sufficient water is not available to satisfy all of the recognized demands. International co-operation is needed to insure that the common advantages of a shared water course are accelerated. Conflicts evolve when a nation's water demands are not being satisfied in a transboundary water course. The absence of co-operation is supposed to lead in conflicts. Many experts have anticipated that water conflicts might be an ineluctable event as water deficiency increases. The possibility for conflicts appears to be gamiest in the developing region, where most of the land is either semi-arid or arid as is the situation in the Nile Region (Ives, 2003).

As mentioned earlier, that the continuous population growth sets growing demands on earth's limited fresh water resources, because two or more than two countries share several and major river basins of the world, which mainly include the Ganga, the Indus, the Danube, the Mekong, the Jordan, the Tigris-Euphrates, the Nile and the Rhine etc; rivalry for growingly finite fresh water resources is expected to raise (see table-1). Agreements and treaties among the countries who share international watercourses have been negotiated and disputes over shared water have been settled, but since the water stress is increasing disputes are emerging among major riparian (McCaffrey, 2007; 2009).

Table-1

Selected Hydrological Features of Important World's Rivers

River	Length (km)	Length Drainage Area (10^3 km^2)	Annual Discharge (10^9 m^3)	Runoff (per km^2 $10^3 \text{ m}^3 \text{ a}^{-1}$)
Amazon	6700	7050	5518	78.3
Congo	4700	3820	1248	32.7
Mekong	4200	795	470	59.1
Niger	4100	2274	177	7.8
Nile	6850	3000	82.7	2.8
Mississippi	3778	3202	562	17.6

Source: IUCN, (2010).

The main uses of international water courses include navigational and non-navigational usages. In the nineteenth century, regulating rules for navigational uses emerged because during that period, navigational uses were more important than non-navigational uses. At the beginning of nineteenth century, the first agreement for navigational uses was adopted; aftermath a number of treaties came into force. To the other end, though some primary rules have come into force but there was no any regulating rules for non-navigational uses emerged for international watercourses. UN convention on international watercourses was adopted in 1997 and after its adoption, preparatory work by international Law Commission and broad deliberations by the United Nations General Assembly it has not been entered into force. The International Law Association (ILA) and the Institute of International Law (IIL), has contributed significantly to the law of international watercourses through adoption of a number of rules. Their work proceeded by many years that of the ILC on the UN Convention. The famous Helsinki Rules of 1966 and the Berlin Rules of 2004 are the work of the ILA which has been adopted.

Principles of International Transboundary Water Sharing

The important fundamental principles that governs the international law of transboundary water management are primarily the principles of 'equitable and reasonable utilization, a responsibility of not to cause significant harm and the principle of cooperation' (Rahaman, 2009). These principles are the base for the formation of the Helsinki Rules on the Utilization of the Transboundary Waters and the 1997 United Nations Convention on Non-Navigational Utilization of Transboundary Watercourses' (Rahaman, 2009:160). Two important aspects of these principles become still more relevant when it comes to analyze the existent regimen in the basin (Mekonnen, 2011). These are the impartial rights to use water resource of the Nile River and benefit sharing. Mekonnen (2011) highlighted that these two supplementary concepts are the basic context for a co-operative transboundary water management regimen.

Where there is no legally founded agreement based on the principles of transboundary watercourses, co-operation would be unexpected. Any allotment of water usage right should be first instituted legally on the basis of principle 'equitable rights to utilize the shared waters sensibly among all riparians'. Although honest and impartial rights ensure the sovereignty and territorial integrity to the water sharing countries, they do not inevitably head to a co-operative modality. According to Teshome (2008) and Mekonnen (2011), benefit sharing enables riparian countries to share the advantages attained from the common water resources instead of individual water. Thus, equitable rights and benefit sharing are the two inherent and essential concepts that allow for co-operative mechanisms to govern inter-riparian terms. As for the Nile riparian countries are concerned, the 1929 and 1959 agreements have been proved as an obstruction to found co-operative framework for management. Since the agreements between the two lower riparians were by nature bilateral, that do not identify the impartial rights of the rest riparians that contribute to the total run-off of the Nile (Abdo, 2004). Moreover, the allocation of the whole water of the Nile between Egypt and Sudan make ineffective the principle of equitable and sensible usage rights of the upper riparian countries. The diversion of Egypt and Sudan remains on their refusal to note that within their territory, sovereign upper riparian countries also have the rights to sensibly consume their water resources within their territory.

However in the past decades, international communities have tried to deduce more universal principles and new rules to regulate shared water resource. Helsinki Rules (1966) of the International Law Association (ILA) and the work of the UN- International Law Commission

(ILC) are among the most significant instances. The ILC in 1991, accomplished the drafting and provisional adoption of articles on the law of the Non-Navigational usage of transboundary water. Within the universal principles established are those of honest and sensible utilizations, the responsibility not to harm other riparians and the responsibility to share hydraulic and other relevant information and data frequently. In particular, how to define and quantify “equitable utilization” of an apportioned water supply stays the most significant and challenging issue confronting several countries. Same challenges also persistent in determining the dynamics in the availability of water either it can be a shortages in the availability of water or it may be flooding situation, so by whom the cost of protection of the excess water or shortages of water will be borne. Main principles out of these are described below.

1. *Equitable Utilization:*

The principle of equitable utilization means that each riparian country is eligible to a sensible, fair and equitable share in the advantageous use of transboundary water resource. It is distinguishes with the alleged “Harmon Doctrine”, which supports that countries can exploit the water resource within their boundaries without any limitation and restrictions, even if this exploitation considerably hurts a neighbouring country. As few upper riparians still refer the Harmon Doctrine, almost all river agreements signed in the last 100 years refuse this pattern and curb the exemption of action of upper riparian countries. The term “Equitable” does not mean the equal use of water, instead it refers that a huge number and diversity of factors that include geography, population, availability of options of other resources, and so on, can be regarded throughout the process of talks and negotiations over the assignation of water rights.

The factors to be considered when allocating international watercourses, according to the Helsinki Rules of 1966-67 and the 1997 United Nations Convention, and Berlin Rules of 2004 that are as follows:

2. *The Helsinki Rules*

Article V¹

- A. What is a reasonable and equitable share within the meaning of article IV to be determined in the light of all the relevant factors in each particular case?
- B. Relevant factors which are to be considered include, but are not limited to:

¹ Chapter-2; of Helsinki Rules: “Equitable Utilization of the Waters of an International Drainage Basin”.

- The geography of the basin, including in particular the extent of the drainage area in the territory of each basin State;
- The hydrology of the basin, including in particular the contribution of water by each basin State;
- The climate affecting the basin;
- The past utilization of the waters of the basin, including in particular existing utilization;
- The economic and social needs of each basin State;
- The population dependent on the waters of the basin in each basin State;
- The comparative costs of alternative means of satisfying the economic and social needs of each basin State;
- The availability of other resources;
- The avoidance of unnecessary waste in the utilization of waters of the basin;
- The practicability of compensation to one or more of the riparian as a means of adjusting conflicts among uses; and
- The degree to which the needs of a basin State may be satisfied, without causing substantial injury to a co-basin State.

C. The weight to be given to each factor is to be determined by its importance in comparison with that of other relevant factors. In determining what is reasonable and equitable share, all relevant factors are to be considered together and a conclusion reached on the basis of the whole (Salman, 2007: 629).

Despite the relevance and comprehensive nature for international watercourses, the Helsinki Rules have no conventional standing or legally binding effect. However, till the acceptance of the UN Convention on watercourses in 1997, the Helsinki Rules was single most governing and vastly referred set of rules for regulating the protection and use of trans-boundary watercourses. The Helsinki Rules were then adopted by the international community as conventional International Law (Bourne, 1996) and the Rules have also been referred to or accepted by a number of countries and organizations.

Salman (2007), presents an extensive coverage of the Helsinki Rules, as well as the UN Watercourses Convention on Water Resources. According to the Helsinki Rules, Specially for Nile basin countries ; Ethiopia, Sudan and many other Nile riparians, rank higher than Egypt in most dynamics of claim (Metawie, 2004), but consistent dominance of Egypt is a result of

its political and economic power. As Egypt has the largest land area and the driest climate in the region, it is the largest consumer of the river water and is the largest importer of cereals among the basin states. However, in terms of contribution of waters to the Nile, it ranks near the bottom. Ethiopia is near the top in terms of country's water share and climate, social and economic needs, cereal imports, low income.

3. The UN Convention of 1997

Article VI: Deals with the factors relevant to equitable and reasonable utilization of shared water (UN General Assembly Resolution: 51/229).

A. Utilization of an international watercourse in an equitable and reasonable manner within the meaning of article 5 requires taking into account all relevant factors and circumstances, including:

- Geographic, hydrographic, hydrological, climatic, ecological and other factors of a natural character;
- The social and economic needs of the watercourse States concerned;
- The population dependent on the watercourse in each watercourse State;
- The effects of the use or uses of the watercourses in one watercourse State on other watercourse States;
- Existing and potential uses of the watercourse;
- Conservation, protection, development and economy of use of the water resources of the watercourse and the costs of measures taken to that effect;
- The availability of alternatives, of comparable value, to a particular planned or existing use.

B. In the application of article 5, watercourse states concerned shall, when the need arises, enter into consultations in a spirit of cooperation.

4. The Berlin Rules

The "Berlin Rules on Water Resources" were approved in 2004 during the 71st conference of the International Law Association (ILA) in Berlin (ILA, 2004). The Berlin Rules were the product of ILA meetings and discussions, and were the revised version of the earlier water conventions, including the Helsinki Rules.

The Berlin Rules are very comprehensive with necessary details that cover major issues concerning water resources, more than those covered in the Helsinki Rules and the United

Nations Watercourses Convention. The Berlin Rules duly added the nearly four-decade experience in water issues since the Helsinki Rules that take into account the development of important bodies of international environmental law, international human rights, and the humanistic law relating to the armed conflicts and war. It is also important to note that various articles in Berlin Rules are relevant to the management of national and international waters.

A major difference between the Berlin Rules and Helsinki Rules along with the UN Convention on watercourses is that the Berlin Rule compels each country to manage the waters of an transboundary basin in an equitable and sensible way and the Helsinki Rules and UN Convention establishes and emphasize the right of each country to a sensible and impartial share. Other distinction is that the Helsinki Rules addressed the principle of not to cause harm only through the determining elements for the sensible and impartial consumptions while need under the Berlin Rules to manage the waters of a transboundary basin in an impartial manner is subject to having due regard for the responsibility not to harm other countries in the basin (McCaffrey, 2001).

Rule, Regulations and Conventions of Navigational Uses of International Watercourses

The industrial revolution led to the starting and development of navigational rules of transboundary watercourses, because there were large transportation of goods and services in many states. Therefore government and industries moved to rivers as the major transportation medium, in that time other means of transport started developing. Furthermore, non-navigational uses like hydropower generation and irrigation were not major rivals of navigational uses at that time. Consequently, navigational usage became the single largest consumer of river water at the starting of the 19th century and transformed rivers into international highways. The comprehensive usage of rivers for navigational purposes required some kind of regulation and motivated the major European countries to bring an agreement in 1815, named the Act of the Congress of Vienna. Through this agreement the principle of freedom to navigate was granted to all the riparian countries. This trend towards priority and freedom of navigation founded and continued to dominant and was expanded in 1885 by the General Act of the Congress of Berlin, another treaty in the context of Congo and Niger Rivers of African continent. The main purpose of this treaty was to furnish the movements of the colonial powers in Africa through offering its rivers for all nations in that

region. Consequently, this Act broadens the freedom of navigational use to non-riparian countries as well. The 1919 Peace Treaty of Versailles continued the relaxation trends in navigation by offering all the navigable rivers in Europe to all the European nations.

Development through industrial revolution resulted in increased demand for rapid and more effective transportation. Therefore, other uses like hydropower generation etc. have also started to satisfy the demand induced from industrial revolution. The stable population growth also furnished other usage like irrigation and household uses more demanding and essential. The Barcelona Convention of 1921, on the Regime of navigable waterways of international significance, confirmed the principle of freedom of navigation as well as identified other usage of rivers. After two years in 1923, the Geneva Convention was adopted, which is related to the hydro-power growth influencing more than one country. This Convention addressed the right of any riparian country to operate any program for the hydro-power development on its territory that it may regard suitable and worthy, subject to “the limits of international law”. The acceptance of this convention however noted another step which refuses the supremacy of navigation that persisted during the 19th century.

The navigation freedom was also influenced after Second World War; and it was gradually restricted to those states that share the water body particularly a shared river. This situation continued to prevail for long and represents contemporary customary international law in this field (Caflisch, 1998).

Emergence of Rules Regarding Non-navigational Uses of International Watercourses

Since there is no universally accepted agreement or treaty related to non-navigational uses of international water courses, each basin can individually develop its own rules to regulate the water course. The International Law Association and the Institute of International Law have formulated some fundamental “water rules” e.g. the Helsinki Rules that have been continuously applied by different basins such as Mekong and Senegal river basins for formulating individual agreements. The Helsinki Rules furnishes with a guideline in order to allocate waters on the basis of “reasonable and equitable” consumption of mutual water that is different from the concept of impartial allocation. Generally the tenants of these rules are accepted and are not adhering in international laws.

In 1997 the UN Convention on the non-navigational usages of international water courses was adopted by the General Assembly of the United Nations and was pending for ratification

of minimum 35 UN member countries since adoption in 1997. Vietnam has ratified as 35th signatory and it became international law mid of August 2014. The Basin states have looked for direction from this convention towards allocating in a best way and legally determine governance over mutual waters. The UN Convention formulated many principles necessary for the management of shared water resources, such as impartial and sensible consumption of water with specific care to human requirements; protection of the aquatic environments and the forwarding of co-operative management techniques. The text also integrates provisions pertaining information, data mechanisms for resolving the conflicts. When signed at least to its signatories, the Convention will furnish with legally binding framework in order to manage trans- boundary watercourses. Yet without ratification, its provisions are being growingly elicited in international meetings. However, approval of the UN Convention may not be setting altogether several legal doubts associated with managing transboundary water resources.

First, the Convention would be adhering only on those countries that have ratified it by signing. Second, international law directs behavior only among sovereign countries but it would not deal the grudges of political and ethnics units within countries. Third, as the Convention provides direction to co-riparian countries, it's vague and often conflicting language may lead in modified and contradictory representations of the principles comprised therein. Lastly, there is no virtual enforcement technique for supporting the Convention's direction. For instance, the International Court of Justice hears cases only on very specific legal points and only with the acceptance of the parties indulges in that. Unlikely local and regional institutions established by the coriparians, with the reference of contradictory global principles and declarations, have focused on particular basin wide concerns and circumstances.

FAO has recognized that since 805 AD to 1984, there have been more than 3600 treaties related to transboundary water resources, most of these related to navigational aspect (Chalecki, *et al.*, 2002:4). After 1950, more than 200 treaties have been accepted that deal non-navigational aspect of usages and the issues related to water management that include hydropower projects, allocations of water for exploitative or non-exploitative usages and efforts to control floods in international basins (Giordano and Wolf, 2003). However, a review of the many agreements from the past half century discloses a overall lack of validity. Allocation of the water is the most disputed area between the co-riparians however it is rarely defined in the water agreements. Lastly, in the exception international water agreements

comprise all riparians, prevented the comprehensive management of basin urged by the international communities. During 1990s, over fifty new multilateral and bilateral water agreements were concluded, which regulating shared water basins in Africa, Asia, Europe, North America, South America and the Middle East. An analysis of these agreements also discloses some significant development trends (Priscoli and Wolf, 2009:64).

Conclusion

As mentioned that CPRs are owned by a community and managed by government or other such potential organisation. Additionally, no rules restrict consumption of these common resources that results to overexploitation and to the disturbance and degradation of ecological niche. Water resource management is a complex procedure, particularly in the case of transboundary water resources as they don't recognize human made political boundaries which hold major water management challenges. The possibility for conflicts seems to be highest where most of the land is either arid or semi-arid and much of the untapped water resources are there in international water courses.

Since, transboundary waters are serving for more than half of the global population, their appropriate planning, management and development are vital to satisfy our present and future demands for water and to avoid possible water scarcity, crisis and conflicts in future. However, unfortunately most of waters have been and continuously inappropriately managed and developed. This trend is emerged due to lack of adequate agreements among the riparian countries and to some extent due to the lack of financial resources, particularly in developing countries. Consequently, these waters have been the roots of several conflicts among the water sharing countries.

The vital objective of water management is to consistently accommodate contending concerns of all water sharing countries. Therefore conflicts related to water management, confrontations and co-operation is associated with water resources management in broader sense. Water resource management growingly needs compromise and consensus of countries if resolutions to problems are to be developed and applied. As issues of competing uses of water intensify, decision makers are increasingly called upon to manage people as well as the water resources itself.

However, institutional exposure in a number of central areas still exists. For instance, some agreements own the flexibility to address dynamics in the hydrological regimen. Moreover,

address water quality, evaluations, supervision and conflict resolving techniques, as increasing often are weak in actual contents. Lastly public participation and enforcement measurement, two factors that can significantly boost up the resilience of institutions, are mostly neglected.

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