

WATER RESOURCE ALLOCATION: LEGAL AND INSTITUTIONAL IMPACTS ON BULK WATER REMOVAL IN CANADIAN AND BRAZILIAN DRY AREAS

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ABSTRACT

First, this paper addresses the concept of BWR for its economic and physical implications, analysing Manitoba and other water laws that cover direct or indirect BWR issues.¹ Regarding Brazilian water legislation, the concept of BWR remains implicit because there are no BWR rules. Second, my paper focuses on BWR opportunities and problems, including BWR purposes, especially to supply water to drought regions. BWR benefits and costs, impacts and alternatives are also analysed. Then, it summarises the results of the previous analyses in order to understand that, although BWR benefits can be less than its costs because of its economic, hydrologic, environmental and social impacts, BWR still remains an alternative to water scarcity. However, this approach tends to be implemented without verifying both the natural and mechanical alternatives available in the environment for water “re-allocation”, namely conservation and other “potential solutions” for

⁽¹⁾ *Alberta Water Act*, S.A.1996, c. W-3.5, *Alta. Reg.* 193/98, *Alta Reg.* 205/98, *Alta. Reg.* 91/99, *Alta. Reg.* 200/99; *British Columbia Water Act*, R.S.B.C. 1996, c. 483, and *Water Protection Act*, R.S.B.C. 1996, c. 484; *Manitoba Water Rights Act*, R.S.M. 1988, c. W 80, *Water Power Act*, R.S.M. 1987, c. W 60, and *Water Resources Conservation and Protection and Consequential Amendments Act*, S.M. 2000, c. 11; *Newfoundland Water Resources Protection Act*, S.N. 1999, c. W-4.1; *Nova Scotia Water Resources Protection Act*, N. S. 2000, c.10 and *Water Act*, R.S.N.S. 1989, c. 500 as amended 1992, c. 14, s. 53; 1993, c. 19, s. 3; 1994-1995, c. 1, s. 176 (14); *Ontario Water Resources Act*, RSO 1990, c. O. 40, *O. Reg.* 285/99, and *Water Transfer Control Act*, R.S.O. 1990, c. W.4; *Quebec Water Resources Preservation Act*, S. Q. 1999, c. 63.

water scarcity.² In other words, the inefficiency of water allocation systems, based on inappropriate legal frameworks and the lack of enforcement, helps to create shortages of water among users and to create the need for new water supplies making water transfers inevitable.

Based on the statements (1) “that individual actors are susceptible to incentives” provided by institutions, which can be both “informal such as customs and codes of behavior” and “formal such as legal regulations and laws,”³ and (2) that the features of water laws have contributed to water shortages,⁴ this paper examines the impact of “formal institutional arrangements” for water allocation management⁵ and the “real” need for

⁽²⁾ Regarding water shortage problems, Percy mentioned other methods different from water storage facilities which have to be considered. He also pointed out that rarely is there “the question of whether water rights legislation exacerbates water shortages and, if it does, whether there are any readily available methods of reform”: Percy, “Water Rights Law and Water Shortages in Western Canada”, *Canadian Water Resources Journal*, Vol. 11, Nº 2, 1986; at 18. The legal aspects and problems of water transfer are studied in Chapters 2 and 3. Regarding institutional arrangements and scarcity problems, see David Percy, “The Institutional Creation of Water Shortages on the Canadians Plains”, *Symposium on Interbasin Transfer of Water: Impacts and Research Needs for Canadas, Saskatoon, Saskatchewan 9 and 10 November 1987* Edited by W. Nicholaichuk and F. Quinn (Ottawa: Canada Environment, 1987), at 451. See also David Percy: “Water Rights in Alberta”, *Alberta Law Review*, Vol. XV, 1977, “Legal and Jurisdictional Aspects of Interbasin Transfer”, *Canadian Water Resources Journal*, Vol. 6, Nº 2, 1981; *The Framework of Water Rights Legislation in Canada* (Calgary: The Canadian Institute of Resources Law, 1988).

⁽³⁾ Karin E. Kemper, “The Cost of Free Water: Water Resources Allocation and Use in the Curu Valley, Ceara, Northeast Brazil”, *Linkoping Studies in Arts and Science*, 137 (Linkoping, Sweden: Linkoping University, 1996), at 33.

⁽⁴⁾ Percy, *supra* note 2, “The Institutional Creation of Water Shortages on the Canadians Plains”, at 451.

⁽⁵⁾ They are relevant parts of the constitution and the related water and environmental laws and policies. This term “formal institutional arrangements” is concept-based on Kemper’s explanation of “institutional arrangements”. She explained that the term institutional arrangements “indicates the structural nature of institutions,” and they “are the structures within which decision making takes places”, *supra* note 3, respectively, at 33 and 45. She also distinguished “between three categories of institutional arrangements; formal and informal institutional arrangements in the water sector, and institutional arrangements originating in other sectors”, at 46. Examples of institutional arrangements in the water sector are: 1) formal- “national water laws, the constitution, governmental or municipal decrees, and administrative rules;” 2) informal- “customs, generally accepted codes of behavior, and social norms;” 3) those “originating in other sectors” - “electricity pricing, market access, and credit markets”, at 46 and 47; see also Figure 2.1 Institutional Arrangements Influencing Water Resources Allocation and Use, at 46, and Table 2.1 Categories of Institutional Arrangements Affecting the Incentive Structure in the Water Sector, at 48. Regarding the constitutional framework related to water resources in either Canada and Brazil, their formal institutional arrangements and the significance of rules relevant to water allocation and BWR includes the division of powers, water jurisdiction regards water ownership, legislative power and management jurisdiction. For instance, some international issues such as water trade under NAFTA rules in Canada. This paper argues that both federal and provincial governments, in Canada and Brazil, can simultaneously apply important rules for BWR within existing, albeit different constitutional powers. Consequently, jurisdictional conflicts can emphasise the complexity of water allocation systems and also add costs to BWR projects. A clear and defined jurisdictional division is essential for a water allocation management regime that is without conflicts and with wise enforcement. As a result, the constitutional rules relevant for and related to BWR can be “pro” or “con” for water scarcity, such as when interprovincial water problems arise.

Bulk Water Removal (BWR)⁶ as a water supply mechanism for Canadian and Brazilian dry areas. The problem is simple: how do present day legal arrangements contribute to or complicate water scarcity problems and the demands for BWR. Both⁷ Canada and Brazil have a relative abundance of water resources, albeit not evenly distributed over their territories. As a result, they have dry areas such as Palliser's Triangle⁸ in western Canada and the Drought Polygon in Brazil's northeast, where are located for instance, respectively, the province of Manitoba and the state of Ceara. Both Manitoba and Ceara have similar environmental and socio-economic aspects regarding water needs: drought seasons,⁹ high water demands, agricultural activities. Moreover, a) regarding Manitoba: 1- "water shortages arise most frequently in southern Manitoba, 2- as a west water legal regime, change have been required for water allocation issues,¹⁰ and 3- this province has already established BWR rules; b) regarding Ceara: 1- it is a Brazilian state that has already established its water legislation system, and 2- it has an installed system of reservoirs and other tools as water supply mechanisms. 3- Ceara does not have any water transfer rules for BWR but it is included as a receiving water area in the planned Sao Francisco River Transposition. In both

⁽⁶⁾ The BWR concept is based on the Canadian federal program: large-scale removals of water by man-made diversions, such as canals, tanker ships or trucks, or pipelines. It is not necessarily exported out of province or the country but it is "exported" from its basin of origin; Environment Canada, *The Management of Water: Bulk Water Removal and Water Export – Frequently Asked Questions*, (Environment Canada: Fresh Water, 1999) on line < <http://www.ec.gc.ca/water/index.htm> > (last update: 18 August 1999).

⁽⁷⁾ Canada and Brazil are relatively equal in size but vastly different in populations. Canada is the larger, with 9,922,330 sq. km., while the land mass of Brazil is 8,514,215.3 sq. km. However the Canadian population is only 28 million, compared with 169.590.693 million Brazilians, Fonte: Censo Demográfico 2000, IBGE. Both retain polyglot populations that are European based; Canada has an official bilingual culture (English and French) but Brazil has an exclusively language (Portuguese), besides the several Aboriginal languages. Canadians have the English common law tradition, except for codified civil law in Quebec, while Brazil follows the continental European civilian legal system.

⁽⁸⁾ "Arid areas of the southern prairies". "The area was first thoroughly described by the Palliser expedition in 1858-59, when it was too arid to be valuable for agriculture," Percy, "Water Rights in Alberta", *supra* note 2, at 143.

⁽⁹⁾ They occurs in the Prairie Ecozone, which "extends across the Prairie provinces and into the midwestern United States, including the southwestern corner of Manitoba. The original ecosystem has been modified extensively by agriculture", *State of the Environment Report for Manitoba, 1997* (Manitoba: Manitoba Environment, 1997).

⁽¹⁰⁾ Percy, *supra* note 2, "Water Rights Laws and Water Shortages in Western Canada", at 15.

places there are claims for granting water supplies for dry seasons through transfers such a BWR.

On the other hand, BWR projects are challenged for their potentially harmful impacts. Bulk water removal (BWR) in the Canadian legal system means any “large-scale removals of water by man-made diversion, such as canals, tanker ships or trucks, or pipelines. It is not necessarily exported out of the province or country but it is exported from its basin of origin.”¹¹ In the Brazilian system, there is neither specific legal nor administrative definition for bulk water removal. However BWR could be recognised by implication in the national water law provisions referring to “... other uses that affect the flow, quantity, or quality of water existing in a body of water,”¹² which require an award. That is, any water project that removes water from its basin of origin to anywhere affecting the flow, quantity, or quality of water. It is not possible to analyse each operative word in the BWR concept in Brazil because of the general lack of statutory definitions. However, there is no specific Canadian legal BWR concept either, because the provincial water statutes¹³ do not explicitly define what bulk water removal is. So, we are left only with the federal Canadian definition of BWR and need to examine¹⁴ its operative

⁽¹¹⁾ *Supra* note 6 [emphases added].

⁽¹²⁾ Article 12, item V of *Law 9433/97*, establishes the National System of Water Resource Management and the National Policy of Water Resources, and it is the legal framework that Brazilian States have to limit their water statute content: *Lei Federal 9.433/97 de 08 de Janeiro de 1997, Política Nacional dos Recursos Hídricos*, 2a.ed. rev. atual. (Brasília: Ministerio do Meio Ambiente-MMA, Secretaria dos Recursos Hídricos-SHR, 1999). As well, Ceara Water Law requires a award for “any undertaking that consume, or affect the flow, quantity or quality of water resources, surface or ground waters,” Article 4 of *Law 11 996/92*, which establishes the Ceara State Water Resources.

⁽¹³⁾ *Supra* note 1.

⁽¹⁴⁾ This examination is based on related water statutes, *ibid.*, but not all statutes have definitions or even clauses that allow an implicit interpretation. For example, *Quebec Water Resources Preservation Act* does not define any operative words. Moreover, it is a simple statute that does not establish many clauses regarding BWR, so probably any details will be done by regulation.

words: “large-scale”, “removal”,¹⁵ “water”,¹⁶ “man-made diversion”¹⁷, “exported”¹⁸, and “basin of origin”¹⁹.

⁽¹⁵⁾ There is no definition of “removal”, only the fact that it is not allowed and that an intention for removal is considered to be within British Columbia’s rules. Perhaps because of this open description it is not opportune to define “removal”¹⁵, only to understand that all actions or even intentions to take water out of Canadian provinces are not allowed. Therefore, a permission water system can consider as “removal”, all water that is transferred, translated, transmitted, transported, transposed, conducted, moved, taken from, extracted, or removed from its basin of origin. That is, it does not matter which verb the law uses to express “removal” of water because that noun identifies an “unnatural” relocation of water out of its basin of origin, which means that BWR occurs.

⁽¹⁶⁾ Water has been clearly understood as all surface and ground water, in any of its forms, liquid, solid or gas, by both systems, Canadian and Brazilian. In the Brazilian system, water is classified by differing criteria such as: (1) Regarding water’s localisation in the ground: a) ground water is water located at a certain depth in the subsoil; and, b) surface water is water located “on” the surface of the earth. This classification allows a sub-classification: internal surface (rivers, lakes, seas), and external surface (territorial sea, high sea), (2) Regarding water’s predominant use: briny, salty, and freshwater. It is classified according to a resolution of the National Council of Environment (Conselho Nacional do Meio Ambiente/CONAMA), number 20/86. In the same way, the Canadian system establishes the concept of water; for example, “water” means all surface water or ground water, whether in liquid or solid form: *Manitoba Water Resources Conservation and Protection Act and Consequential Amendments Act*, Section (1) Definition, *supra* note... Furthermore, most BWR statutes also define water with this same meaning, see the other Canadian provincial water acts. Applying both water concepts, Brazilian and Canadian, in the BWR definition, “large-scale removal of water” must be clearly understood as all surface and (or) ground water, and in any of its forms, liquid, solid or gas. At no point in Canadian legislation is a chemical definition offered (*i.e.*, “H₂O”): for the law, “water” is water. It is an operative word that not only can define the BWR as an extraction of surface and/or ground water, but also can define the jurisdiction where the competence of freshwater and salt is different. That is, it is under provincial jurisdiction. Moreover, in Brazil, groundwater is exclusively a state competence, while surface water depends of its localisation and ownership, federal or state. Therefore, BWR management can be under both jurisdictions, federal and state.

⁽¹⁷⁾ Man-made diversion, “such as canals, tankers ships or trucks, or pipelines,” gives a partly exemplary list, and it is possible that new man-made diversions can be regularly invented. This list allows legal prohibition to any invention of diversions that can remove, transfer or take out water. That means that a “man-made diversion” is an open legal concept. Manitoba as well as British Columbia, Newfoundland, Quebec and Nova Scotia define neither “man-made diversion” nor “any way”. They just establish “removal of water from”, which means that the law does not consider by what “means,” respective acts, *supra* note. So, any means for removal of water can be considered. To transfer or remove water “**by any means**” is established in the Alberta and Ontario legislation. However, in practice, there are different effects, such as ecological and economic effect, from each type of diversion which the law should consider, such as ecological and economic effects; see Richard C. Bocking, “The Real Cost of Dams, Diversions, and Water Exports”, in *Water Export: Should Canada’s Water Be for Sale? Proceedings of a Conference held in Vancouver, British Columbia on May 7-8, 1992* (Ontario: The Canadian Water Resources Association, 1992), at 283, and Charles Birt, “Infrastructural Requirements for Bulk Water Export by Tankers”, in *Water Export: Should Canada’s Water Be for Sale? Ibid.*, at 45-56. For instance, there are effects such as those from the indivisible nature of reservoirs and canals and from other man-made mechanisms. Bocking noted that “tanker export raises serious questions about water rights and the impact of withdrawals on coastal estuaries,” *supra* note 17, at 283, he emphasised the high level of risk in water exports by tankers, and stressed that one accident would be enough for a catastrophe. In conclusion, project by project each different “man-made diversion” has to be assessed regarding its distinct impacts, when considering the means that can lessen such impacts relative to the environment.

A water permission system requires a clear definition of the adjective in “large-scale”, in order to determine which water removal is or is not BWR. How much water must there be before it is a BWR? What amount of water measures “large-scale”? The answer ultimately must be relative and arbitrary. The concept of “large-scale” can be differently recognised; for example, the *British Columbia Water Protection Act*²⁰ establishes: “large scale project”, which means a project to divert or extract a peak instantaneous flow of 10m³ or more a second of water. The *Newfoundland Water Resources Protection Act*²¹ does not define “large-scale”; however, it allows that “water may be removed from the province where the water is contained in containers of not more than 30 litres in volume”, S. 5 (a)²². The question remains: how to interpret these rules? Does legal

(18) BWR is legally understood as a “water export;” however it is not only as transference inter-frontiers, but also as intra-boundaries. *Manitoba Water Resources Conservation and Protection Act* prohibits a removal of water “...from a water basin or sub-water basin” (S.2), *supra* note 1. If BWR occurs it is a water transference from an original basin to anywhere, within or out of province. Therefore, the legal issue here related to BWR is that it is a kind of “water export” which can be under both federal and provincial jurisdictions, because BWR can occur as different kinds of “export”: intra-provincial, inter-provincial, inter-national. As a result, it can be a polemical issue between Canadian provincial and federal levels of governments, regarding international agreements under environmental and trade issues. For instance, can the Canadian provincial BWR regulations “influence” or pre-empt the water export rules of NAFTA? Could water be exported from B.C. where there is a BWR moratorium to the U.S.A. on NAFTA rules? Furthermore, can an intra or inter-provincial transfer, which is a type of “water export”, be a precedent for opening “international water export”?

(19) A basin of origin is the first locale of the water, the primitive place where the water originated. Most water laws do not define what an original basin is but they indicate where specified basins are; for example, the *Manitoba Water Resources Conservation and Protection Act*, Section (1) recognises that “**water basin**” means the Manitoba portion of the Hudson Bay drainage basin. While, in Section 1, *Alberta Water Act* establishes: (1) (gg) “**major river basin**” means (i) the Peace/Slave River Basin, (ii) the Athabasca River Basin, (iii) the North Saskatchewan River Basin, (iv) the South Saskatchewan River Basin, (v) the Milk River Basin, (vi) the Beaver River Basin, and (vii) the Hay River Basin, with boundaries as specified in the regulations. Alta. Reg. 205/98 establishes in Part 2 Diversion and Transfers, Section 10 (1), Major river basin boundaries, note.... On the other hand, the *Quebec Water Resources Preservation Act*, *ibid.*, simply establishes “...no water taken in Quebec...”, S. 2, without identifying any original basin other than the whole of Quebec. In conclusion, the basin of origin is that place where the water originated. A province has discretion to establish itself as a basin (the whole province), major basins (different provincial regions as distinct basins) and even as sub-basins (subdivisions within the major basins). Moreover, water laws and policies have adopted the river basin approach as a territorial unit for water management.

(20) *Supra* note 1, in S. 1 “Definitions and interpretations

(21) *Ibid.*

(22) The same legal technique is in the *Ontario Water Transfer Control Act*, *supra* note 1, S. 3 (6): “[S]ubsection (2) does not apply to water packaged in a container having a volume of 20 litres or less.” Subsection (2) is the major prohibition of transference of water.

positivism apply: what is not prohibited is allowed? If the measure of water that can be removed is under 30 litres in Newfoundland, how many containers at one time are allowed?

However, the effects²³ of any water transfer are more important than the quantity of water removed. Any water transfer regulation of BWR should consider these effects, rather than the quantity of water itself. For instance, the *Manitoba Water Resources Conservation and Protection Act* does not specifically define “large-scale,” but it clearly considers BWR as any amount of water “that could, individually or collectively, have significant adverse effects on the ecological integrity of Manitoba’s water resources or their associated ecosystem.”²⁴ Regarding the amount of water removed there is a distinction between small and large water transfers. Gary Fritz²⁵ has

(23) Faced with any water transfer’s uncertain effects, one symposium had as an objective: “to identify the data and research needed to improve our understanding of the implications of water transfer in terms of natural processes, social values and policy alternatives”, the *Symposium on Interbasin Transfer of Water: Impacts and Research Needs for Canadas*, *supra* note 2, at vii. But besides water transfer uncertainties, it is possible to assess among its implications the morphologic effects. In the context of Canada’s “opportunities for large scale storage and diversion projects and whose rivers exhibit highly variable and complex morphologies, the morphology of rivers is important because it provides the physical framework for many other river-related resources such as fisheries, recreation and navigation. By far the most important factor determining the morphology of a specific river reach is the flow regime. When it is artificially altered through interbasin diversion or regulation, morphologic changes invariably follow, but they can range from barely perceptible to dramatic for reasons that are not necessarily obvious a priori”, Rolf Kellerhals, “Morphologic Effects of Interbasin Diversions”, *Symposium on Interbasin Transfer of Water: Impacts and Research Needs for Canada*, *supra* note 2, at 7. The water transfer effects are studied in this chapter.

(24) *Supra* note 1. Like Manitoba’s Act, the *Nova Scotia Water Resources Protection Act* asserts that “...whereas large-scale removals of water, individually or cumulative, may compromise both the ecological integrity of a system and sustainability of the resource...”, *ibid*. Even though “large-scale” is not measured, the amount is determined by the impact on the environment. Moreover, Section 8 (1) foresees that “the Governor in Council may make regulations: (c) defining any word or expression used but not defined in this Act,” *ibid*. Probably, a regulation will establish what is understood as “ecological integrity” and “sustainability”, which are debatable concepts.

(25) Gary Fritz, “Exporting Water: Toward a Policy Framework”, in *Water Export: Should Canada’s Water Be for Sale?* *Supra* note 17, at 57.

emphasized different types and sizes²⁶ of water exports, noting that: “the export of products that rely heavily on the use of water such as beverages, electricity, and paper; containerized shipments of water by truck, rail, or ocean tanker; pipelines carrying treated water supply between neighbouring communities; and minor interbasin diversions of shared boundary waters are generally considered small-scale exports.”²⁷ In addition, “large mega-projects” are those such as the North American Water and Power Alliance (NAWAPA), and the Grand Recycling and Northern Development (GRAND) Canal.²⁸ Besides the large-scale water transfer effects, there are the effects

(26) In most cases, size is adopted as one water transfer criterion for its implementation because of the quantity of water supply and economic reasons. However, “how much water should be provided in region ‘X’?” Usually, “the procedure was to estimate total and urban population in each water resource region for a certain period, the quantity of water used per capita and per unit of product, total national output of water-related goods and services, and the regional distribution of production, and from these estimates to construct the regional total of water for withdrawal uses, on-site use, and flow uses”, Charles W. Howe and K. William Easter, *Interbasin Transfers of Water-Economic Issues and Impacts* (Baltimore and London: Johns Hopkins Press, 1971), at 18. This method assumed that: 1) supplies of water will continue to be available at current prices; 2) there will be no technological change; and, 3) current inefficiencies in the use of water will persist; *ibid.* However, this technique can generate errors, “for under the stimulus of water shortage and increasing prices for water, the relationship of water use to population and production will change substantially. The basic difficulty with the requirements approach is that it makes no attempt to measure water-related benefits, a quantity necessary for rational water development decisions”, *ibid.* Discussion of benefits and costs of water transfer comes *infra* at (pp. added in last version). This approach clearly does not consider dynamic population characteristics such as growth and migration.

(27) Gary Fritz, *supra* note 25. Moreover, regarding small-scale exports, he explains that “in fact, given their relatively limited impact on society, the environment, and the general availability of water, these small-scale transactions are often not considered exports at all”, *ibid.*, at 58. On the contrary, others advocate that small-scale exports have harmful effects on the environment; for instance, “Cheryl Mendoza, a project manager with the Lake Michigan Federation, said the governors should be looking for ways to protect the lakes from a series of little diversions rather than a single big exportation proposal: ‘the real danger now is from the combined effect of proposals like that of the Perrier Corp. in Michigan and elsewhere to withdraw water from the Great Lakes basin in numerous smaller projects that fall under the minimum threshold;’ by Katherine Rizzo, “Great Lakes governors want water export agreement in place by 2004”, The Metro Region (14 December 2000) on line <<http://www.startribune.com/stOnLine/c/s.dll/article?thisStory=83143737>> great lake. Frank Quinn also has stressed the distinction between small and large scale water transfer, remained the Canada’s Inquiry 1985, which has position: “in its eventual response, the federal government accepted this distinction rather than try to provide one sweeping policy for all situations”, in “Treading water: will Canada ever settle the export issue?”, in *Water Export: Should Canada’s Water Be for Sale?*, *supra* note 17, at 114. So, the polemic related to small and large scale water transfer effects still has an important place; see also Bocking’s commentary *infra* note 17.

(28) Gary Fritz, *supra* note 22, at 58. Summary description of the projects: 1) the North American Water and Power Alliance (NAWAPA) is a project developed in the early 1960’s by the Ralph M. Parsons Company, with plans to transfer 160 million acre-feet per year from Alaska, northwestern Canada, and watersheds surrounding Hudson Bay and James Bay to arid areas in midwestern and western United States, the prairie provinces of Canada, and northern Mexico. “The total drainage of the project encompasses about 1.3 million square miles, with runoff of 800 to 1,000 million acre-feet per year (MAFY). The estimated cost of the project in 1990 dollars is \$300 billion,” *ibid.*; and 2) the Grand Recycling and Northern Development (GRAND) Canal is a project “conceived in 1959 by Tom Kieras, calls for the construction of a dike between Hudson Bay and James Bay to transfer, currently a salt water body, into a fresh water lake through the impoundment of rivers that empty into the Bay. According to the plan, water that would be reversed and canals, dams, power plants, and locks would be built to deliver this “new” water into the Great Lakes. The Great Lakes, in turn, would become a reservoir for fresh water waiting to be transferred to other destinations in North America. The estimates cost of the project in 1989 was \$100 billion,” *ibid.* Regarding other projects descriptions, see Charles W. Howe and K. William Easter, in Table 2. Summary of Information on Plans Proposed for Regional Water Transfer, *supra* note 26, at 12-13.

of small-scale water transfers to be considered: “Unfortunately, it is precisely at the land-water margin that the impact of water projects is most severe, whether for hydroelectric generation or for water diversion and export. Since the most serious impacts result from the first water removed, even a small diversion can have serious consequences.”²⁹ If a small diversion already presents serious consequences, a large-scale water removal has characteristics that emphasise these outcomes: size, indivisibility of system, and a life-span.³⁰ A large-scale project’s impacts cannot be denied. These are economic, hydrological and ecological.³¹ Unfortunately, most of the analysis of water transfer projects considers the economic aspects but too often denies environmental and social ones.³² However, even an economic analysis recognises the unavailability factor in water transfer projects involving BWR, which need to consider: 1. Project’s Characteristics;³³ 2. Benefits and

⁽²⁹⁾ Richard C. Bocking, *supra* note 17, at 279. “The Real Cost of Dams, Diversions, and Water Exports”, in *Water Export: Should Canada’s Water Be for Sale?* *Supra* note 17, at 279.

⁽³⁰⁾ Characteristics pointed out by Charles W. Howe and K. William Easter, *supra* note 26, at 4.

⁽³¹⁾ *Ibid.* at 5.

⁽³²⁾ *Supra* note 25, at 64, Gary Fritz argued that the social and environmental impacts of water exports should be evaluated from an ecosystem perspective.

⁽³³⁾ As commented, large-scale water removal projects present high economic, social and ecological costs from their distinct characteristics: size, indivisible system, life-span. Actually, both small and large-scale water removals present numerous effects as explained previously.

⁽³⁴⁾ Charles W. Howe and K. William Easter used some concepts such as “direct benefits”, “secondary benefits” and “costs” criteria for American water transfer projects such as the Columbia River-Colorado River transfer economic evaluation. The authors developed some criteria for this economic evaluation. For instance, regarding measurement of direct benefits, they suggested that “there are several ways in which direct benefits from water can be measured. The first utilizes the demand function for some water-using entity, the level of aggregation depending upon the particular problem. A second method uses as a budget approach to determine willingness to pay by computing a residual ‘left-over’ to water. Other methods use data on farm sales, water sales, and water rentals”, *supra* note 26, at 21. All methods and analyses are in this book, because the goal here is not to explain the economic rules of water transference by calculus, statistics and so on, but only to point out the “potential” results of an economic evaluation. The authors also argued that “it is possible to state the set of conditions that must be fulfilled by any proposed interbasin transfer project if it is to be justified on grounds of economic efficiency,” *ibid.* at 21. Questions from these conditions: 1-How do we measure direct benefits to the (initial) individual water user? 2-How do we trace and value the direct benefits from return flows generated by the initial users? 3-Under what conditions will there be secondary benefits and costs from a national point of view and how do we measure them?

Costs;³⁴ 3. Purposes³⁵ and Considerations; 4. Measured Impacts and Alternatives.³⁶ As J.C. Day and Frank Quinn pointed out, regarding some water projects in Canada: “the forecasts of project costs, benefits, and markets for energy, crops or other outputs have often been overly optimistic. Normally, project costs are much higher and benefits much lower than the originally anticipated.”³⁷

Regarding hydrological and ecological impacts, surely, they vary from project to project but they can occur during the construction period and through the operating lifetime. For instance, operating impact concerns in the Gisborne Lake Water Bottling and Export Project³⁸ led Environment Canada

⁽³⁵⁾ The purpose of most interbasin transfers is to provide water both for “the replacement of water supplies that are being exhausted or degraded” and for the expansion of economic development activities such as “irrigation agriculture”, Charles W. Howe and K. William Easter, *supra* note 26, at. 56, and “hydro-electricity,” David Percy, “The Institutional Creation of Water Shortages on the Canadian Plains” *supra* note 2. As in Canada, the few Brazilian water projects related to water transfers have been for energy generation. However, water uses and environmental aspects to be considered in BWR are not only directly related to each project’s purposes but also to those that can be indirectly identified project by project, also those distinct consequences from consumptive and non-consumptive water uses such as fish and fish habitats, recreation.

⁽³⁶⁾ H.G. Hengeveld, “Climate Change and Water Resources”, in Proceedings of the Symposium on Interbasin Transfer of Water: Impacts and Research Needs for Canada, *supra* note 2, at 33.

⁽³⁷⁾ J.C. Day and Frank Quinn, “Dams and Diversions: Learning from Canadian Experience”, *Proceedings of the Symposium on Interbasin Transfer of Water: Impacts and Research Needs for Canada*, *supra* note 2, at 53. Regarding costs and benefits forecasts and the conclusion that benefits are less than the costs in water transfer projects, see also Charles W. Howe and K. William Easter *supra* note 26.

⁽³⁸⁾ *Guidelines for Preparation of the Terms of Reference for the Gisborne Lake Water Export (McCurdy Group) Proposal*, document prepared by the Environmental Assessment Committee (EAC) of Newfoundland as a requirement for the Gisborne Lake Water Bottling and Export Project. So, the proponent of this project responded to the guidelines’ requirements in the Terms of Reference (TOR). Both guidelines’ requirements and its answers are available in the “Terms of Reference for the Preparation of an Environmental Impact Statement and Comprehensive Study Report”, Jacques Whitford Environment Limited, *Gisborne Lake Water Export Project* (1997) [unpublished, archived at Department of Environment and Labour of Newfoundland]. This project was proposed by the McCurdy Group of Companies of Gander, which would “bottle and export high quality water from the Gisborne Lake, Grand Le Pierre, located on Fortune Bay, Newfoundland,” LGL Limited, *Environmental Impact Statement and Comprehensive Study Report Gisborne Lake Water Bottling and Export Project (EIS and CSR)* (1998) [unpublished, archived at the Department of Environmental and Labour of Newfoundland] at 1. This project would include the “construction of the following infrastructure :1- flow control structure (low head barrier) at the Gisborne Lake, 2-Intake at the south end of the lake, and 3- a combination tunnel/ pipeline to a bottling plant and marine loading facility,” *ibid.* at 1. “The plan would be constructed on the east side of Grand Le Pierre Harbour in order to serve the proposed marine lodging facility, to be constructed near the harbour’s entrance. Water (on the order of 300,000-500,000 cubic meters (m3) per week) would be withdrawn from the lake to be bottled for export as well as piped to tankers. At full production, one ship per week (alternating tankers and freight vessels) would dock at the loading facility. The design life of the proposed facilities is 30 years

to provide comments regarding the EIS operation requirements,³⁹ such as information on routine operation and maintenance of the water bottling and export facility, in particular, information regarding the operation regime (rate, timing, and duration of water withdrawal), routine monitoring, maintenance and inspection of equipment, and procedure for marine and surface transportation of water.⁴⁰ Any water transfer project requires the assessment of potential impacts (of construction, operation and maintenance, as well as decommissioning of the proposed undertaking) on fish and fish habitat within a watershed, on instream flow needs, as well as on other environmental aspects, such as resource conflicts and the wildlife perspective. This should also include a discussion of resource conflicts, potential effects of de-watering within the watershed and economic, social and cultural implications for surrounding regions.⁴¹

Unfortunately, most rivers, lakes, ground water supplies and other sources of water have been used to often for different purposes without water quality and quantity considerations. Water resources have been consumed, used, and discharged. However, each of these water uses can have distinct effects and values: economic interests, hydrological aspects, ecological conditions, social claims, aesthetic merits and others.⁴² Moreover, regarding

but the Project could run many more years than that, " *ibid.* at x . The water would be exported to world markets, according to the proponent : "the project has been proposed in response to the excellent and growing worldwide markets for both bottled and bulk freshwater. As such, it represents a good prospect for economic development, " *ibid.* This project is one of the data bases for BWR opportunities and problems' commentaries developed here.

⁽³⁹⁾ EIS in the item 2.4.4 Operation, the proponent gave some general explanation such as: "the operation of this facility is expected to have minimal impact on the environment. A water tanker, with tugboat assistance, will be moored at the marine facility and connect to the pipeline. A trained operator will be in place to reduce potential for uncontrolled release of water," *ibid.*, at 31

⁽⁴⁰⁾ LGL Limited, the *Environment Impact Statement (EIS) and Comprehensive Study Report Gisborne Lake Water Bottling and Export Project Addendum* (1999) [unpublished, archived at the Environmental of Newfoundland], at 8. This document is an addendum of Gisborne's EIS prepared by LGL Limited for McCurdy Group of Companies to respond to "the various government agencies, Environment Canada, Fisheries and Oceans, and the Water Resources Management Division of the Department of Environment and Labour, through the Environmental Assessment Committee," *ibid.*, at 1.

⁽⁴¹⁾ *Ibid.*, at iv.

⁽⁴²⁾ Regarding legal effects in water rights; for instance, consumption of water such as irrigation can decrease water supply affecting equitable distribution of water: Maria Concepcion J. Cruz, *Legal and Institutional Issues of Irrigation Water Rights in the Philippines* (Laguna, Philippines: Agrarian Reform Institute, University of the Philippines at Los Banos, 1987), Table 2, Different Forms of Use for Water Right, at 7.

the different values of water uses, they have different considerations for different persons and groups in society. Certainly water uses for purposes such as energy production, or generally for industry or for irrigation, have strong economic considerations. On the other hand, what great economic returns exist for water uses that are related merely to human and wildlife uses, and their health and ecological aspects?

There will always be a dispute in establishing priorities for each of these interests in water allocation.⁴³ Who decides which is the preferable water use?⁴⁴ Which criteria are the bases for deciding this priority? How? As Scott explained, “any solution to the problem of allocating water between unmarketed (environmental) uses and priced industrial uses requires that each use of water in each place be valued by a decision-maker in some common unit. This is true for decision-makers in government, markets or within individual water-using units. Otherwise the currently favoured uses will eventually capture all the water.”⁴⁵

Thus, any reallocation of water resources by large-scale water transfer projects involves institutional and political arrangements and lawful agreements to be implemented.⁴⁶ For instance, the Gisborne Project’s Environmental Impact Study (EIS) “was prepared in order to meet the requirements of both provincial and federal environmental assessment

⁽⁴³⁾ David Percy noted that “in areas where there is considerable pressure on water supply, ...normally, uses of water for domestic, farm and fire-protection purposes are considered most important, followed by municipal uses and then uses for industrial, commercial, and irrigation purposes. The evaluation can also include ecological and recreational factors,” *The Framework of Water Rights Legislation in Canada*, *supra* note 2, at 78. More than the dispute for water, there are water uses and water rights conflicts; for such examples see Alastair R. Lucas, *Security of Title in Canadian Water Rights* (Calgary: The Canadian Institute of Resource Law, 1990), see the Chapter 4: Alberta Case Studies.

⁽⁴⁴⁾ Some water laws establish a list of priorities regarding water uses: Percy, *The Framework of Water Rights Legislation in Canada*, *supra* note 2.

⁽⁴⁵⁾ Anthony Scott, “International Water Marketing: Nations, Agencies or Individuals”, *Water Export: Should Canada’s Water Be For Sale?*, *supra* note 17, at 143. Regarding decision-makers in free-market environmental system, perhaps the market can solve water uses problems however it cannot solve water rights conflicts by itself.

⁽⁴⁶⁾ As Charles W. Howe and K. William Easter, *supra* note 26, at 5.

processes.”⁴⁷ In Brazil, an example of the need for such institutional and political arrangements, as required for the Sao Francisco River Transposition plan⁴⁸, could involve similar arrangements, as well as technical complexities.

⁽⁴⁷⁾ EIS, *supra* note 40, at 35, see also see Table 2.3. Permits and approval likely required for the Project, at 36. The Project may require several federal permits if any of the waters affected are considered navigable (i.e., Section 5 (1) of the *Navigable Waters Protection Act*) or if the Project is deemed to result in harmful alteration, disruption or destruction of fish habitat (i.e., Section 35 (2) of *Fisheries Act*). In addition to provincial and federal environmental assessment approvals, the Project may also have to obtain at least twenty-four municipal, provincial and federal permits. Among these required permits, there are for instance: Certificate of Approval for Dams and Appurtenant Structures; Certificate of Approval for Bridges; Authorization for Works or Undertakings Affecting Fish Habitat; Highway Access Permit; Certificate of Approval for any Industrial or Processing Works; and so on.

⁽⁴⁸⁾ This project was proposed in the following years: in 1852 by Dom Pedro II Emperor, in 1913 by the Federal Department for Infrastructure against Droughts, in 1919 again by the Federal Department for Infrastructure against Droughts that recognised the technical unavailability of the project, in 1972 by the Parliamentarian Wilson Roriz, in 1981 by Minister Mario Andreazza, in 1994 by the Minister Aluzio Alves, and in 2000 as a new project by the National Integration Ministry, which is currently discussed at Federal Parliament. This history was presented for the Sao Francisco River Transposition Work Group of the Federal Parliament by Romulo Macedo, who is the current Water Resources Secretary of the National Integration Ministry, in a public hearing on 09 February, 2000 in Brasilia. Fernando Bezzara, who is the Minister of National Integration, also participated in this public hearing, giving a general explanation and comment. This public hearing document is available in Portuguese on the Brazilian Federal Legislative Power website, “Transposicao do Rio Sao Francisco”, <http://www.camara.gov.br/intranet/comissao/index/grp/ctrami_gt>. However, Joao Alves Filho pointed out that the first discussion about the Sao Francisco River Transposition plan was in 1847, through Antonio Marcos Macedo’s preliminary studies, Crato-Ceara Superintendent, and he also noted that in 1998 a new study was presented by Beni Veras Minister, in *Transposicao das Aguas do Sao Francisco: Agressao a Natureza X Solucao Ecologica* (Maceio: Edicoes Catavento, 2000). This author also presented a history of this project but noted that most proposals were not implemented because “none of them presented consistent projects, they got only preliminary studies,” *ibid.* at 48, (translation by Sandra Cilce De Aquino), see also explanation form 45-49, *ibid.* In this book, Joao Alves Filho presented a project proposal different from the National Integration Minister’s project for the Sao Francisco River Transposition as a matter of the federal legislative power. Regarding this current project, it is an official “plan” for a Sao Francisco River Transposition by the National Integration Ministry. However it is an “incompleted plan” with unfinished studies. Actually, this Ministry has not divulged details of the project’s proposed engineering design or its environmental impact. However this plan has been “debated” by federal parliamentarians as a “undefined intentions”. The Water Resources Secretary of the National Integration Minister, Romulo Macedo, commented on these intentions, arguing that this project is not a “real” water transfer but as ordinary as other “water canalization” (projeto de “aducacao de agua”), *ibid.* at 9. He said that water transference gives the wrong idea of large-scale interbasin water removal, because it makes one think about an immense amount of water removal, *ibid.*, at 9. He uses the word “adutora,” which means channel, aqueduct, canalization to conduct waters from a water origin to a reservoir [“adutora” - canal, galeria ou encanamento destinado a conduzir as aguas de um manacial para o reservatorio, in *Novo Dicionario Aurelio de Lingua Portuguesa*, 2ª Nova Edicao R Revista e Ampliada (Rio de Janeiro: Editora Nova Fronteira, 1986) at 51]. He also stressed that the project is simple from the engineering view point, and it plans to take only 2,5 % of flow river basin (2,5% de vazao), *ibid.*, at 10. Based on Fernando Bezzara’s interviews,

This plan aims “to complement the hydrological regimes”⁴⁹ of the Brazilian Semi-Arid Northeast, which is known for lack of water resources, in the following states: Pernambuco, Paraíba, Rio Grande do Norte, and Ceará. On the other hand, water is planned to come from the São Francisco riparian states: Minas Gerais, Bahia, Sergipe, and Alagoas. Can the federal government “properly” implement such a project? Questions remain, such as: “What type of agency could carry out the planning and management of a large interbasin project in a way that would be economically efficient from the nation’s viewpoint and agreeable to the many states physically affected?”⁵⁰ How would such projects be financed?”⁵¹

who is the Minister of National Integration, and on “confidential information” given by the technical staff related to this official federal plan, João Alves Filho has criticised this ministry project and presented another plan, *ibid.* at 54. This unofficial plan is explained in Alves’ book. This plan has two goals: 1- to revitalize São Francisco River (“revitalizar plenamente o rio São Francisco”); and 2- to grant a plentiful water supply to Setentrional Northeast of Brazil (garantir água abundante para o Nordeste Setentrional), *ibid.*, at 69-73. Moreover, it would be done through the reinforcement of flow in the central channel of the river (“reforço de vazão na calha central do rio”), in a 10 or 15 year engineering plan (realização plena entre 10 e 15 anos), *ibid.*, at 77. That is, to increase the power of river tributaries, involving São Francisco, Paraná and Tocantins river basins (“consiste no levantamento dos afluentes envolvendo as bacias dos rios São Francisco, Paraná e Tocantins”), *ibid.*, at 80. Moreover, it involves the following thirteen (13) given tributaries (“afluentes doares”), *ibid.*, at 81: 1- In São Francisco: Paracatu, Urucuia, Carinhanha, Correntes, Grande (Bahia), and Tequitai; 2- Rio Paraná: Grande (Minas Gerais), Paranaíba, and I. Marcos; and 3- Rio Tocantins: Peixe, Peixinho, Balsas, and Galhau, at 81. Inclusion of the last two river basins is one distinction from the federal government plan. He suggested that this plan foresees the possibility to build 18 hydroelectric plants at the medium and high point of the São Francisco River, besides 88 small and medium hydroelectric plants in the semi-arid region. This plan foresees a system of reservoirs connected by channels with a capacity to regulate more than 170m³ of water per second, adding up a granted “flow” of 1,000 m³ of water per second”, *ibid.*, at 81. These waters would be taken from the three river basins, São Francisco, Paraná and Tocantins watersheds. This includes two big channels, which catch water from the São Francisco River and send it to Pernambuco and to Paraíba. Twelve other channels are involved: Xingo, Dois Irmãos, Serra do Alagoano, Jacaré Verde, Bahia Norte, Bacias Cearenses, Arco Iris, Terra Nova, Metade do Sertão Pernambuco, Via Prata, Jati Acu, Piauí Caninde, *ibid.*, at 184-185. “Considering that this project life construction would be between 10 and 15 years, its average year cost would be the maximum US\$ 1, 20 billion/year or US\$ 791 million/year, respectively, for 10 or 15 years”, *ibid.*, at 188. (All translations are done by Sandra Cilce De Aquino). The author did this estimating in 2000, when the Brazilian currency was around \$ 0, 55 (fifty five cents), and he only counted the project infrastructures such as channels. However, the Brazilian currency has been unstable since the end of 1998.

⁽⁴⁹⁾ The explanation of the Secretary of Water Resource of the National Integration Ministry, Romulo Macedo, *ibid.*

⁽⁵⁰⁾ The project has been planned by the National Integration Ministry; however, such complex project requires the participation of other fields such as environmental agencies.

⁽⁵¹⁾ Paraphrasing Charles W. Howe and K. William Easter, *supra* note 26, at 5.

The legal problem is not only to define a closed concept of “large-scale” regarding quantity but also to consider any other measures that cause adverse ecological effects, such as in Manitoba’s BWR legislation. This consideration can become the basis for deciding whether or not to give permission regarding a water removal. Like any other water use, BWR involves conflicts of interests because of the diversity of “choices” and “needs” in water utilisation.⁵² As said a few decades ago: “Large-scale water development projects have been receiving increasing publicity and public attention in the past few years... have attracted widespread attention to the very uneven distribution of the water resource, both geographically and through time. One type of prescription for alleviating these conditions has been the large-scale transfer of water from one river basin to another, from one region of the country to another.... The public advocacy of these transfers by various groups and the rebuttal provided by others have frequently clouded basic questions that need to be asked and answered if water transfers are to receive the unbiased and informed evaluation required for wise policy formulation.”⁵³

The necessity for clarity in the frequent questions raised about water transfers ultimately comes from the governmental aim to control, monitor, and assess water allocation properly. However, a concrete control depends on the enforcement of laws and efficient licensing depends on a wise allocation system. An inappropriate water usage and water allocation can contribute for more scarce water resources.⁵⁴ Therefore, both the Canadian

⁽⁵²⁾ In Canada, regarding the interbasin debate, David R. Percy noted that “the possibility of inter-basin transfers is in the air again on the Canadian prairies. The diversion of water from the abundant supplies of the northern portion of the region to the parched south is raised from time to time, especially in Alberta. In the seventies, Manitoba carried out, for the purpose of generating hydro-electricity, the major Churchill River Diversion, which has been the focus of much attention at this Symposium. In the recent past, the Garrison Project created the possibility of an inter-basin transfer with major international implications;” *supra* note 2, at 452. About Canada’s water export discussion, Frank Quinn noted it “is almost 3 decades old and shows no sign of ending”, *supra* note 24, at 111. Yet, regarding Canada’s water export, Anthony Scott stressed that “the ‘debate’ is quite static and devoid of research”, in “International Water Marketing: Nations, Agencies or Individuals”, *Water Export: Should Canada’s Water Be For Sale?* *supra* note 17, at 141. In Brazil, for instance, there is a water transposition project, the Sao Francisco River Transposition *supra* note 36, has been for almost 150 years since 1852 but it has never been implemented.

⁽⁵³⁾ Charles W. Howe and K. William Easter, *supra* note 26, at 1.

⁽⁵⁴⁾ For example, the estimates for people without potable water in: Ethiopia is 83%, Afghanistan 79%, Morocco 41%, Paraguay 67%, Haiti 60% and Poland 11%, Vladimir Passos De Freitas, “Poluicao de Aguas”, in *Direito Ambiental em Evolucao* (Curitiba: Jurua Editora, 1998), at 362; translation by Sandra Cilce De Aquino.

and Brazilian water systems have to be questioned about their water allocation efficiency regarding water conservation, scarcity and needs for transfers. Water is essential to all forms of life. It is one of the most important natural resources that deserves legal protection and effective treatment. Water has become “subjected to a range of legislative controls”⁵⁵ but it continues to face obstacles and restrictions, both in the public and private spheres. Environmental protection from abusive exploitation of natural resources, to conserve nature for future generations, is basically done by governments, but other non-governmental organisations also practise it. Public administration is a governmental activity practised by legislative, jurisdictional, and executive powers. This is true for every action, and inaction, related to the framing, forming and implementing of governmental policies. In this paper, public administration focuses on the practice of executive power and on its formal institutional arrangements, in order to co-ordinate and impose decisions and choices aimed to realise specific-goals for water allocation.⁵⁶

Water allocation, including the administration of water scarcity and of bulk water removal issues, is one such managerial and policing activity.⁵⁷ The major legal instrument that governs water use and rights is the permit system.⁵⁸ A water permission system is required because water is under a

⁽⁵⁵⁾ Neil Finkelstein & Rachel Urman, “*Constitutional Jurisdiction in Relation to Water Law*”, (National Symposium on Water Law, Environmental Law CLE Program, Toronto, April 1999) [unpublished].

⁽⁵⁶⁾ “Different water resources allocation mechanisms fit into different types of overall water resources management systems. Water trading, for example, does not preclude integrated water resources management, but is to a certain extent dependent on such,” Kemper, *supra* note 3, at 24. As she noted it is possible to isolate allocation issues and make them the principal focus of the research, *ibid*.

⁽⁵⁷⁾ There is a distinction between administrative power and jurisdiction. The first is an executive activity that administers and fulfils policies. The second, administrative jurisdiction, is a capacity to make policy and decisions that for Canadian and Brazilian’s water resources is defined in their Constitutions.

⁽⁵⁸⁾ Cruz has pointed out that “water rights are governed by three major legal instruments: the water permit; formal agreements arrived at after court proceedings and/or amicable settlement; and informal agreements among competing users based on social-cultural or political factors,” *supra* note, at 42.

scarcity risk.⁵⁹ Increasing irrigation, urban and industrial developments often demand water. However an inappropriate water usage and water allocation can contribute to more scarce water resources.⁶⁰ Thus, Manitoba, Ceara and any other water allocation systems in dry areas have to be analysed regarding their efficiency, and how their institutional arrangements are organized and operated? Do they have a well define water rights? Are they personalised, non-transferable, absolute quantificational? Do they grant rights and access for new users? Are their water rights flexible enough to be transferable for conservational purposes and proportional to actual stream flow ? Are their models administrative, technical or participatory? Does their model have the public interest in mind? Are their institutional structures and policies reasonable enough to provide enforcement and control over water rules? Do their structures sustain their costs? Do they have mechanisms for pricing water uses, for solving water conflicts, for conserving water resources? How do they evaluate, plan, and monitor their scarcity problems?

Actually, a region is often considered deficient in water resources without either re-allocating its resources or adopting conservation policies. Garry Fritz's considerations regarding water exportation include: 1) the availability of alternative sources of water in the importer's region; 2) the current supply of the host region's water; and, 3) the future demands of water users in the host region.⁶¹ Therefore, it is necessary not only to establish how serious the "water crisis" is in the importer's region but also to verify the export region's conditions and the implications for its water exports. Water

⁽⁵⁹⁾ "Water is a natural resource that can be renewable or depletable, depending on the source and on use. Water supplies comes from *surface waters* and *groundwater*. Surface water includes lakes, streams, and oceans. Groundwater has been accumulated over hundreds of thousands of years in underground aquifers that lie between layers of rock. Groundwater is primarily a depletable resource stock, although a small proportion (less than 5 percent) can be withdrawn each year and renewed by of rainwater or snow melting in the aquifer", John M. Hartwick and Nancy D. Olewiler, *The Economics of Natural Resources Use*, Second Edition (USA: Addison-Wesley, 1998), at 175. Besides water can be non-renewable resources, non all waters are potable or even accessible; "these are water in liquid form is 97,72 % (97% salt and 0,72% freshwater), solid is 2, 25% (such as iceberg) and vapor is 0,03% of Biosphery"; Jose Afonso da Silva, *Direito Constitucional*, 2ª edicao revista (Sao Paulo: Malheiros Editores, 1994), Vladimir Passos de Freitas, *Direito Administrativo e Meio Ambiente* (Curitiba: Jurua Editora, 1995), at 84.

⁽⁶⁰⁾ For example, the estimates for people without potable water in: Ethiopia is 83%, Afghanistan 79%, Morocco 41%, Paraguay 67%, Haiti 60% and Poland 11%, Vladimir Passos De Freitas, "Poluicao de Aguas", in *Direito Ambiental em Evolucao* (Curitiba: Jurua Editora, 1998), at 362; translation by Sandra Cilce De Aquino.

⁽⁶¹⁾ Gary Fritz, *supra* note 25, at 60.

transfer projects cannot be allowed based simply on projections of water demand which are, in turn, based on assumptions 'that adequate water supplies will be made available under the present general pricing policies, that there will be relatively little change in presently known technical methods of water use, and that, with the exception of increased application of techniques for improving the efficiency of irrigation, present inefficient methods of using water will continue.'⁶²

This paper argues that the major current problem is inappropriate water allocation management; and that either a simple BWR moratorium or a non-assessed and non-monitored BWR is an unsustainable solution to water scarcity issues. The allocation aspects have been neglected in water resource management because water quality and flood control have been its primary focus. Such issues exist even in drought regions but water scarcity constitutes an additional problem, which requires discrete management approaches.⁶³ In conclusion, such assumptions should be questioned and both the country and the involved regions must answer: 1) about their water allocation systems: how does the process through which water resources are allocated ensure the best use of water in an efficient and effective manner? (2) how does the process of water allocation guarantee equitable distribution among users of the water source?⁶⁴, and 3) about the BWR itself: does the importing region need more water? What does it need it for? How is it using existing supplies? (4) Can sufficient water be secured through conservation and re-use, to satisfy its needs? (5) To what extent and under what criteria should the national and regional governments assist local water conservation measures? (6) What are the prospects for improving water supplies within the importing region, through weather modification, control of evaporation losses, groundwater development, vegetation management and modification, or other means? (7) Are present irrigation practices wasteful? Is it economically, socially, culturally and ecologically sustainable to transport water for hundreds of miles? (8) How will the exporting region be affected if such amounts of water are taken away? (9) What are the benefits and costs?⁶⁵

⁽⁶²⁾ Charles W. Howe and K. William Easter, *supra* note 26, at 10.

⁽⁶³⁾ Paraphrased Kemper, *supra* note 3, at 23.

⁽⁶⁴⁾ Paraphrasing Cruz, *supra* note 42, at 38. She elaborated these questions, checking the implementation of the Philippine Water Code.

⁽⁶⁵⁾ Paraphrased, *ibid.*, at 16.

Any kind of BWR has economic, hydrological, environmental and social impacts. Furthermore, some consider BWR to be a “water export [that] makes no sense economically, environmentally or socially.”⁶⁶ However, we need to research more⁶⁷ about BWR’s “acceptable” impacts where there is a lack of alternatives for water scarcity in some regions, and to believe that water policy has to be seen not in only political or economical but also socio-ecological aspects, which are not separated from each other, or from their human and natural aspects.

It is time to be good students of water interbasin project effects, because as J.C. Day and Frank Quinn noted: “We have had the opportunity to review the effects, good and bad, of several major Canadian interbasin diversion projects over the past decade. Even though Canadian move more water by volume across basin divides than any other people on earth, it is apparent that we are not yet able to anticipate the full range of consequences of our actions. This is because we have become *more proficient as project builders than as students of their effects and consequences*. Our engineering technology for controlling and redistributing the flow of mighty rivers has been good enough to apply around the world, but almost everything else has been relegated to an afterthought status: market forecasting, community relations, interagency and intergovernmental coordination, and environmental monitoring and assessment.”⁶⁸

⁽⁶⁶⁾ Richard Bocking, *supra* note 17, at 286.

⁽⁶⁷⁾ But not use “scientific uncertainty” as an excuse to avoid solving BWR issues.

⁽⁶⁸⁾ J.C. Day and Frank Quinn, *supra* note 37, at 52 [emphasis added].