

EMERGING ETHICAL ISSUES IN FRESHWATER MANAGEMENT: THE UNESCO COMMISSION (CAIRO - MARCH 1999) by Jerome Delli Priscoli, PhD

Introduction

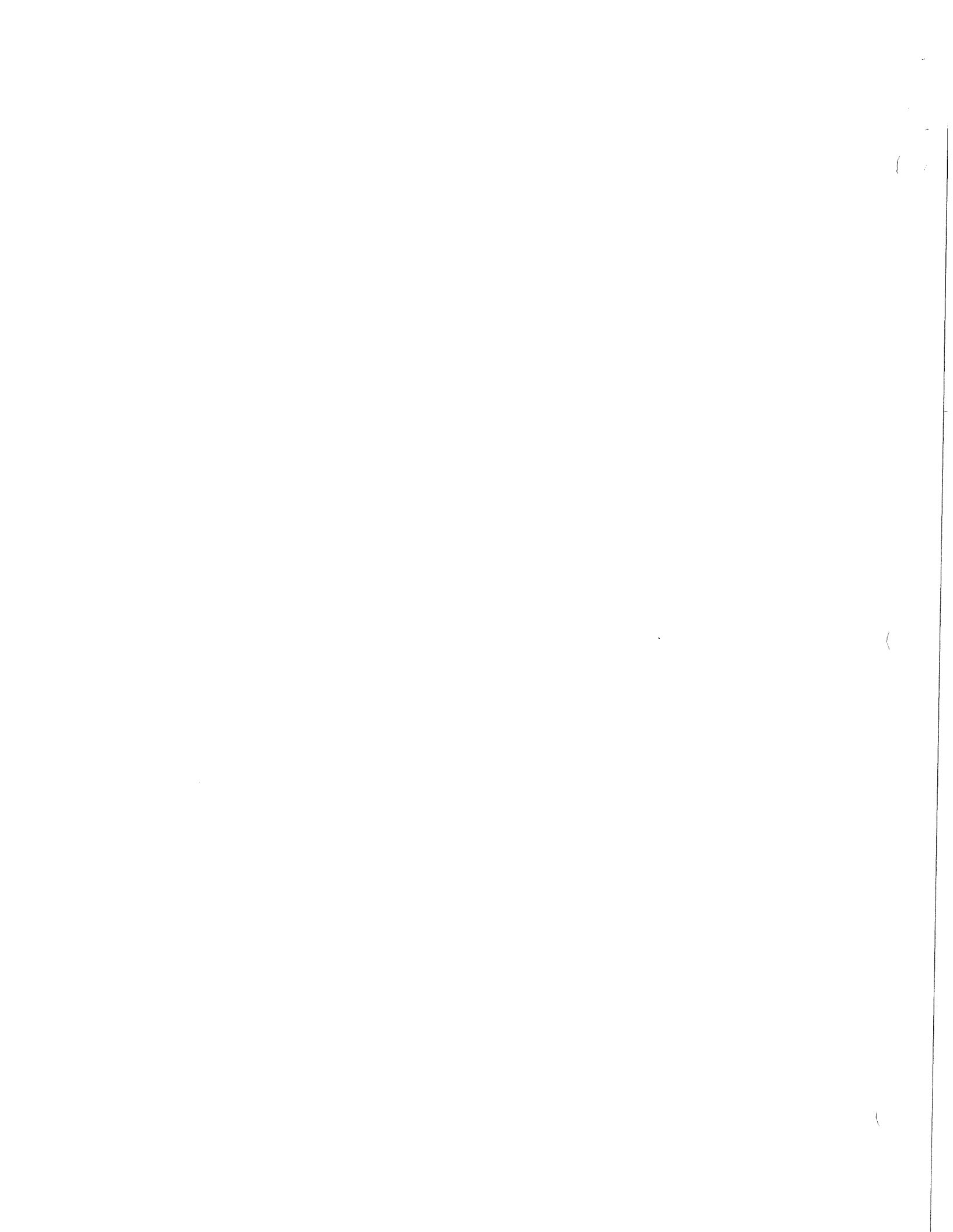
The control of water is the control of life and livelihood.¹ Over the last two decades, several important International Conferences have called for an ethical commitment to provide for humanity's basic water needs: Mar del Plata in 1977;² the Rio Earth summit in 1992; the UN sponsored comprehensive assessment of world's freshwater resources in 1997, and others. Linkages between water policy and ethics are increasingly found throughout the World. For example, the recent South African constitution links water access directly to human dignity when its background speaks of how the failure to provide access to sanitation and water to many in the majority significantly impacted on the right to dignity and the right to life. Indeed, recent challenges to traditional engineering approaches to water management have gained prominence primarily through ethical and moral appeals, usually driven by ecological or environmental values.

The UNESCO Commission on freshwater ethics has been looking at: ethics and water uses, decision making and water management; water and broader social ethics; ethical challenges of technology and professionalism; water and conflict, and elements of a new ethic of water. I want to provide a brief glimpse into these areas.

First: Ethics and Water Uses

The statistics are becoming familiar. Roughly 25% of the World still has no access to water supply and 66% have no access to sanitation services. Experts estimate that a four fold increase in annual spending on water and sanitation infrastructure would be necessary to achieve full coverage by 2020.³ The World Bank estimates this to be around \$600 billion. The costs not to fix this are real, about three times this figure in health related diseases alone, but hidden. In the developing world 90% of such diseases are related to water. Floods and droughts kill more people and incur more costs than any other disaster and their damages are rising especially among the poorest of the poor. Irrigation produces one third of our food from about one sixth of our land. However, as population and food needs grow, irrigated land decreases. And we could go on..

The point is: We can see profound ethical implications in all aspects of the traditional water uses such as: flood control and management; drought contingency planning and management; irrigation; hydroelectric power and agriculture; water supply and sanitation; navigation; ecological maintenance and health; public health and disease control and others. Ethical considerations concerning water uses tend to revolve around; the distribution of benefits and costs of the services; who gets how much of the water and who pays; the distribution of risks, who is vulnerable and to what degree. Today, this includes service for nature and ecology as well as people. Ethical considerations also depend on whether the uses are seen as an end in themselves or a means to some other ends such as economic development. Here are some



examples.

The perception of water problems as absolute versus distributive or relative scarcity lead us to different ethical norms. Often the perception of absolute scarcity come with prescriptions of conservation, efficiency and reuse. These are critical. However, these technical terms can hide what distributional perceptions lead us to: relative deprivation, redistribution, reallocation, social unrest and even violence. Thus, to frame the water crisis in absolute terms is ethically insufficient. We must also describe and commit to dealing with the distributional consequences of prescriptions emanating from such description.

Global patterns of water expenditures expose important ethical questions in how we balance or prioritize human expenditures. For example, some people say it would take about 7% of the World's military expenditure to bring water to most people.

Decision makers must understand the linkage between development strategies and conflicting issues of water allocation, supply and pricing and water must be seen in the context of macro-economic national and regional strategies.

We must recognize that everyone has a right to some level of water. We also must recognize that such rights are balanced by responsibilities in both the use and provision of water. Indeed, we may not be able to reach agreement on a universal number. However, the ethical imperative is to commit to the goal that all people have enough water to live.

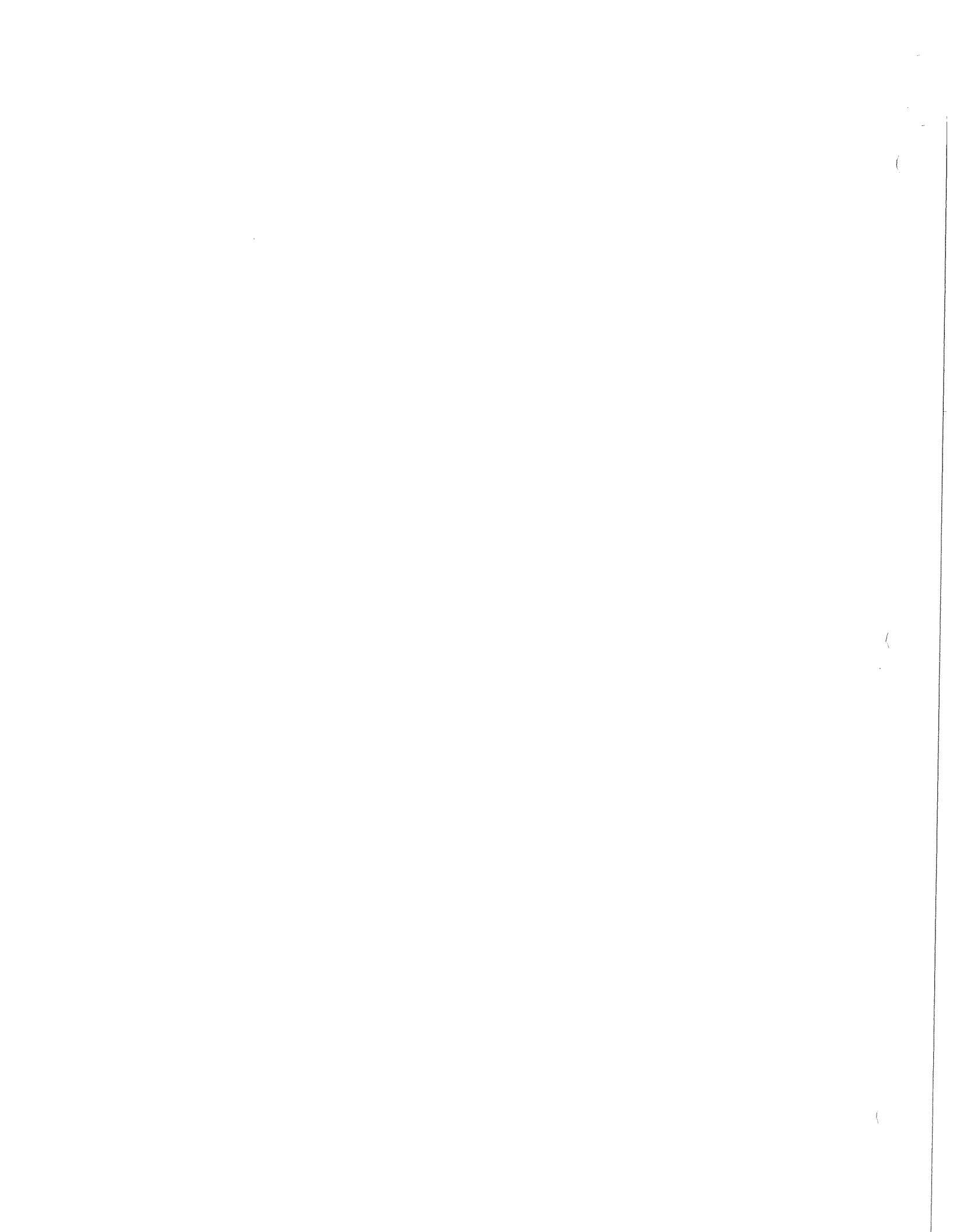
We must deal equitably with asymmetries in flood management planning: especially between short term concentrated interests and long term dispersed beneficiaries. We must assure equitable mitigation of those bearing immediate costs for the benefit of those reaping long term gains.

The opportunity costs for irrigated crops must become more explicit in national water policy. Can irrigation practice remain unchanged and justified in situations of scarcity where the economic return to industrial water use is often 200 times higher than irrigation, or where upwards of 70% of available freshwater accounts for around 5-10% of the GNP?

We must encourage more equitable distribution of water in irrigation networks because this will allow more water to be irrigated with the same amount of water ⁴

Traditionally, many countries and ESA's have looked at water as it relates to goals of other sectors and not comprehensively as sector itself. This has reduced the capacity, especially in countries which are vulnerable to natural disasters, for early warning and monitoring of potential water related emergencies. It has also skewed the cost and value estimates of water and generally hidden some of the realities of risk and uncertainty behind management measures.

And there are many others one can sight. Let me move to our second area:



Second: Ethics and water management decision making

Ethical implications are also clear in all aspects of water management decision making such as: planning, regulating, operating, financing and investing, designing and implementing; and, others. Ethical considerations concerning decision making and management tend to revolve around; who participates; what are the decisions they participate in; do they have access to formulating options or only to reacting to options already formulated; how and what type of opportunity costs are considered; the valuing, implicit or explicit, in trade-off decisions; level and type of information open to the public; disclosure and characterization of impacts; the way professionals interact with non professionals and the use, as well as misuse, of technical and professional information.

The relation of the flow of money and flow of benefits and costs must become more transparent.

Today, privatization is seen as a way to increase efficiency and to bring more water to more people, i.e. to democratize water and sanitation. However, privatization also raises question of open information flow and transparency. Organizations which operate to seek a profit are frequently not as prone to share critical information on water flow or water quality as public counterparts, particularly where there is a weak regulatory environment.

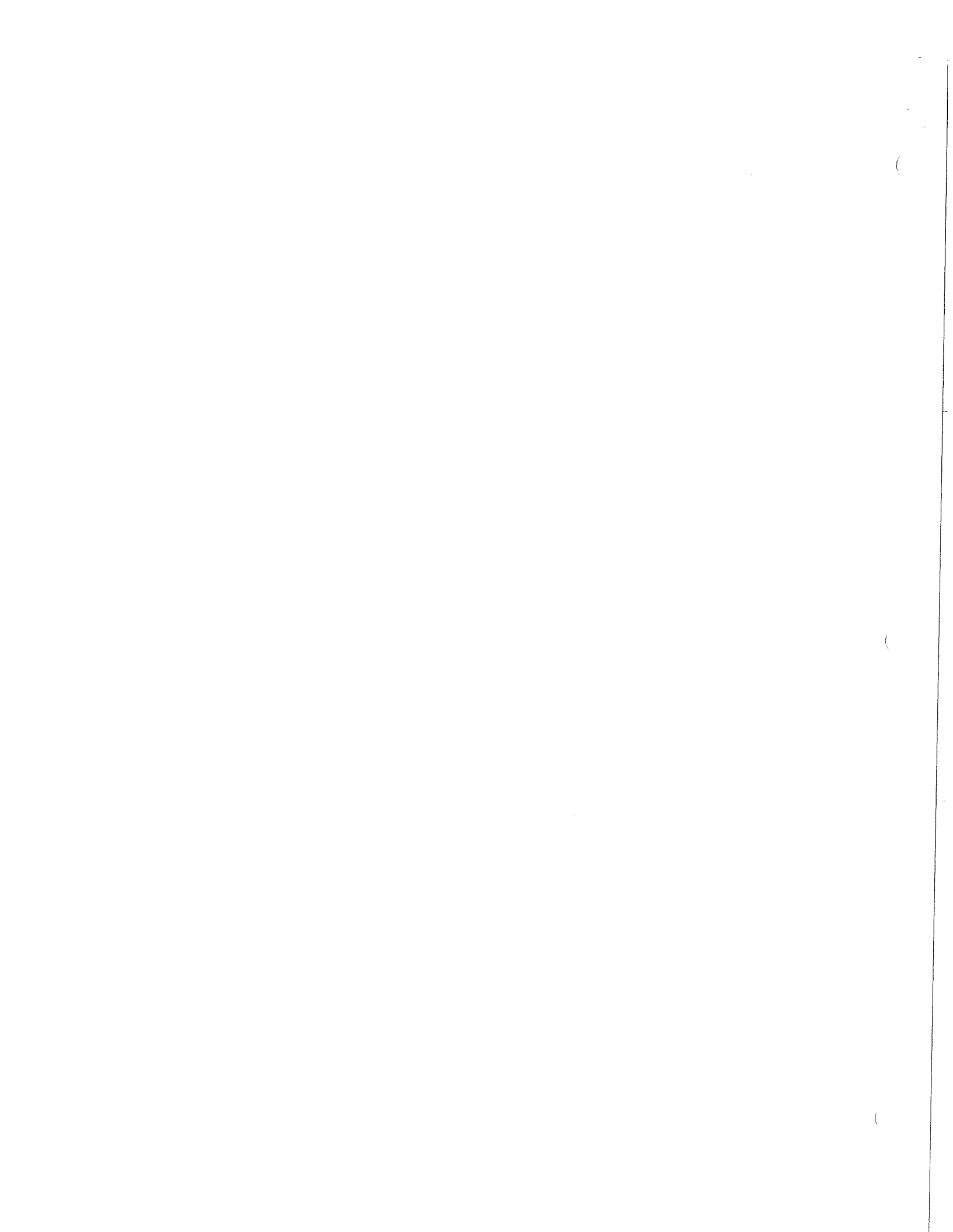
Privatization of the vendable aspects of water can lead to older notions of single purpose planning and management of water and directly contradict the ethic of integrated water resources planning. Some water services such as flood control cannot be privatized. Others, such as navigation, can only be privatized to some degree. So pushes to privatize may encourage the fragmentation which integration seeks to overcome.

How do Global actors, often more powerful than countries, become accountable to regulations.

Recognizing water as an economic good - almost a mantra of the world water community - has generated heated political debate, much fear and revealed fundamentally differing values associated with water among various cultures. Some claim that fostering the notion of water as a commodity moves public perception away from the reality of water as a common good and from a sense of common duty and responsibility toward water. In other words, there are profound ethical implications in perceiving ourselves as water citizen versus water consumers.

Of course the reality is that water is used as a factor of production and managed as a commodity, in some degree, by all societies. Whether explicit or not it is valued and it clearly incurs opportunity costs. Water is priced in some way by all societies. The poor often have no choice but to pay high prices. Black markets for water on the streets results in the poor spending between 5-10% of their income, and some places as much as 20% of their income, on water.

Responsible water use depends as much on assuring fair shares of water as pricing.



The debate over organizing for water must move beyond choosing at the poles of privatization and public bureaucracy to the myriad of possibilities between these poles.

Our renewed democratic ethic and new ecological ethic can conflict and must be balanced. The first calls us to new notions of individual freedom, transparency, and accountability in decisions. The second to collective responsibility and holistic and comprehensive systems.

In the coming years the number of people without water is likely to grow. How will they get it? Projects, in addition to conservation, will be needed. Today they can be planned in an ecologically sensitive way. But if we wait the pressure to quench the thirst of the poor people may force the building of ecologically unsound projects.

We must produce data commensurate with the emerging needs for decision making. As we increase efficiencies and operate water systems (urban and irrigated) closer to their margins, risk based management will become more prominent. However, such management requires good hydrological, social, economic and other data - and such data is sparse.

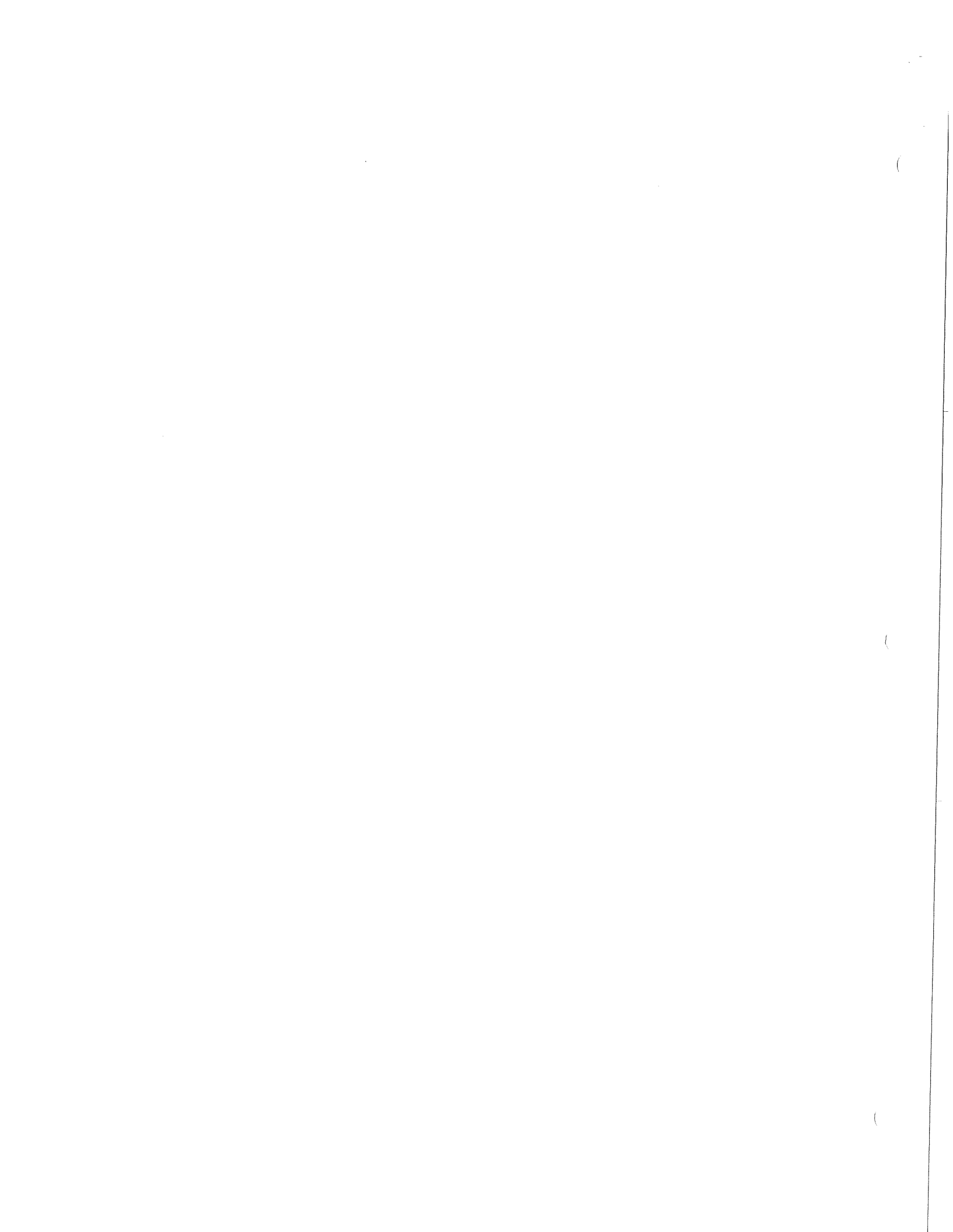
River Basins should be more of a norm for social organization in many parts of the World. Agenda 21, as many previous documents, calls for river basin and/or watersheds to have more influence on development decisions.

To the best of our ability, we must know the consequences of our actions. This is a precondition to ethical action. Thus, impact assessments are crucial for both informed technical and good moral decisions. However, we must move beyond being paralyzed by either our understanding of such consequences or the uncertainties surrounding them. This can lead to unethical delay.

Third: Water and Social Ethics

Debates around water resources management also mirror broader debates of social ethics. The social context of ethical questions concerning water tend to revolve around; notions of water as a common good; water and its connection to human dignity and basic needs for life; water as a facilitator of well being of people; rights and responsibility toward water access; water and social justice; and the wealth generating and development roles of water infrastructure.

One way to look at the close connection of water to broader social ethical concerns is to look at how water management concerns relate to ethical principles found in major faith traditions. For one example much of the water debate is highly relevant and can be reflected in basic Christian social ethics⁵. In this tradition, the Principle of human dignity means that all persons are worthy of respect and the human person is an end and not a means. So too with water. There is no life without water and those to whom it is denied are denied life. Water for all and meeting minimum needs are vitally tied to the principle of human dignity. The Christian ethical principle of association means that the person is social as well as sacred. The principle of participation means that individuals, especially the poor, must not be shut out from participating in those



institutions which are necessary for human fulfillment. Both these ethical principles mirror a major theme; namely, that those whom are impacted and who would benefit from water (which is vital to their fulfillment as humans) must participate in its planning and management.

The Christian ethical principle of solidarity teaches that we are our brothers keepers and loving our neighbor relates directly to our growing sense of interdependence. More than almost any other resources issue, water continually confronts humans with their upstream and downstream interdependency and calls humanity to more solidarity. Indeed, the current call for integrated water management could be seen as a direct subsidiary teaching of this principle. Solidarity is supported by the principle of human equality which appeals to the almost primordial sense of fairness found in humans. This is commonly taken to mean rendering to each person their due. In a sense this describes perfectly our challenges in river basin management today.

Both ethical principles are furthered buttressed by the Christian ethical principle of the common good. The common good is understood as the social conditions that allow people to reach their full human potential. By almost everyone's definition water is a common good. Our arguments are mostly about how to manage this common good - water. This principle reminds us how ethically important the management of water really is. It is a vital facilitator to reaching full human potential and realization of human dignity. Without good water management or with poorly skewed water management human potential and dignity are diminished for all and denied to some.

The Christian ethical principle of stewardship teaches respect for creation and moral responsibility to that creation. However, it also calls for wise use of creation and not pantheistic reverence for nature. Indeed, much of water management is about finding an ethical balance among using, changing and preserving our water resources and land. The World consensus on sustainable development can be seen as an ethical norm directly descendent from this principle. For what is sustainable development, if not achieving balance among the wise use (utilitarian) and respect for intrinsic value of the resources? Indeed, many of the policy recommendations for sustainable development are couched as ethical norms for actions.⁶

Much the same can be said for similar principles found in Islam, Buddhism, Hinduism and most other faith traditions throughout our world. For example, Hindu tradition considers water as a powerful media of purification and as a source of energy. In the Regvada, a water prayer is offered; "The waters in the sky, the waters of rivers, and water in the well whose source is the ocean, may all these sacred waters protect me".⁷ In Islamic tradition, the Shariah, which many feel is a better term to use than law, literally means the "source of water." The Shariah is the source of life in that it contains both legal rules and ethical principles.⁸ It tells people water is; proof of God's existence, unity and power; proof of god's care, and; proof of resurrection as water restores life every day. In the Qur'an there are sixty references to water and over fifty references to rivers. There are many references to distribution of water. It's statements on life preserving water for the individual and sharing small quantities of water such as obligations to give water to visitors are well known. It has less to say directly about long term livelihood of



water and what might be called its macro economic uses. However, obligations at such level can be implied. For example, the Qur'an states that water should be divided among people and that the resources should not be monopolized by the powerful against the poor.⁹

Fourth: Ethical Issues of Professionalism and Technology

No doubt, technology will change how we look at water. The World Water Council has already suggested that in the next twenty five years, falling energy cost are likely to reduce the cost of desalinizations to about one third of what it is today; research into genetic foods are likely to reduce water needs significantly in the short term; the technology of dry composting now allows us to separate the need for water from sanitation.

Together these three trends will effectively eliminate much of the water supply problem often driving public 'gloom' and "doom" scenarios. This is good. However, they will not eliminate the needs for multipurpose management and integration of flood management, agricultural uses and many of the other ethical issues brought up earlier. Indeed, such blessings might actually compound some problems by making it OK to continue with some bad consumptive and other habits.

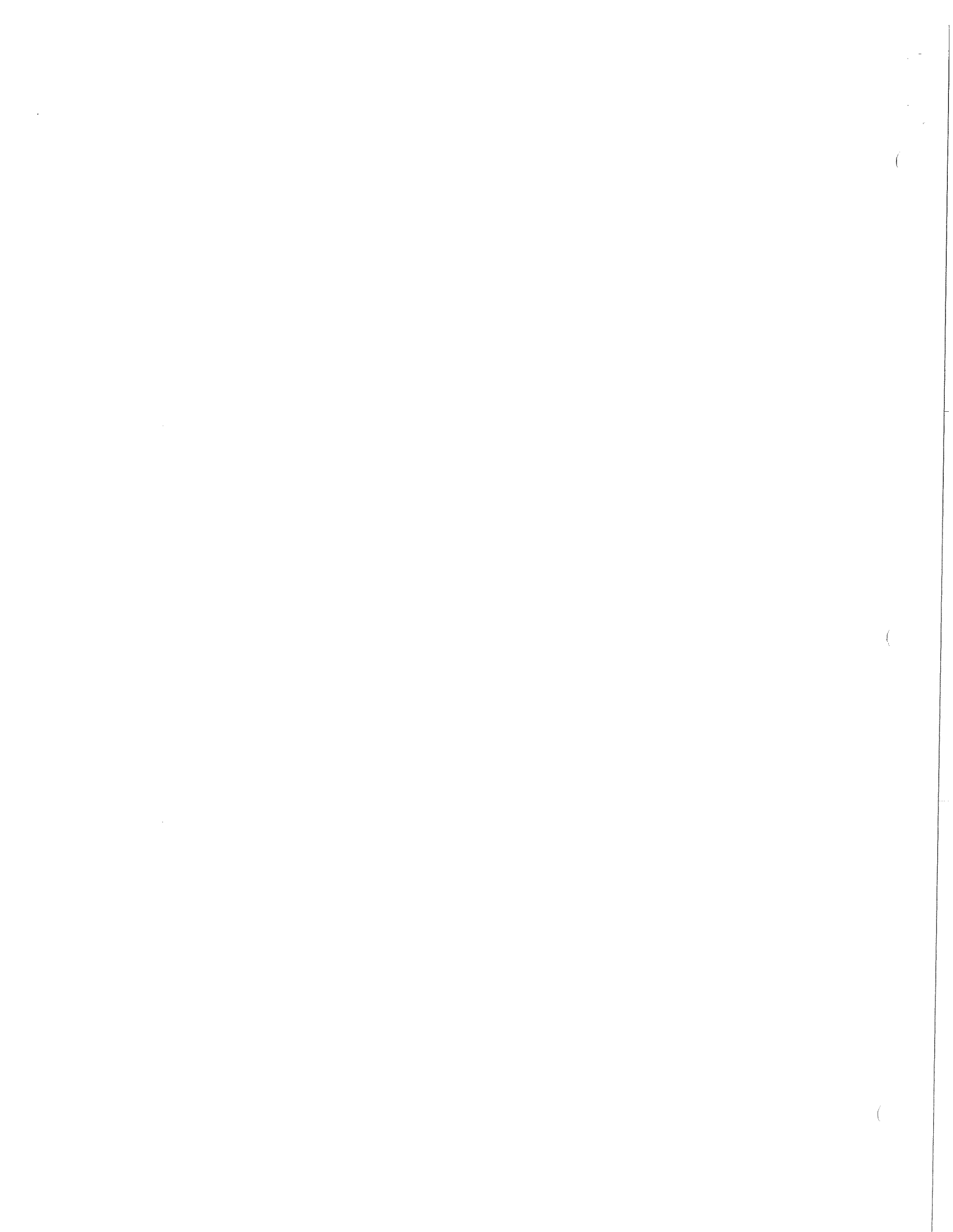
It is unethical to discard technological solutions, based primarily on unidimensional concerns, just as it is to discard traditional approaches. Both are needed. Water policy should not let the controversies over dams color major needs for technology. As water systems begin to reach their limits, authorities face the immense ethical imperative of managing residual risk to society. As societies begin to operate water, sanitation and irrigation infrastructure close to their limits of efficiency they may also reduce their capacity for flexible response to extreme hydrological events.

The ethical basis of professionalism is changing. We are moving from a traditional paternalism, often found in engineers past and in today's environmental regulators, to a newer notion of informed consent.

Ecological disputes must overcome the syndrome of advocacy science if we are to preserve the legitimacy of the scientific enterprise which is so necessary for water management. What are the ethics of using science to persuade publics especially under conditions where there is fundamental disagreement among scientists and where even the models and data themselves are weak?

What are the ethics of making the price of agreeing with new ecological perspectives a denial of the relevance of a water managers past work and a often moral indictment of his/her "historic sins"? We must move beyond simple impugning the motives or ethics of past water managers behavior based on today's knowledge.

Fifth: Water and Conflicts



Water is forcing us to rethink our notions of security, dependency, and interdependency. Increased interdependence through water sharing plans and infrastructure networks is often viewed as increasing vulnerability and dependence and reducing security. However, there is an alternative way to look at interdependence. They can be seen as networks which will increase our flexibility and capacity to respond to exigencies of nature and reduce our vulnerability to events such as droughts and floods and thereby increase security.

This flexibility addresses the basic, almost primordial, fear and insecurity that has driven humans to become tool makers and engineers. That is: reducing the uncertainty and building predictability and safety into what was often experienced as a harsh environment. While often challenging the engineering mentality, this same fear, that we might kill life, inspires environmental concerns. Both relate to the fear of death we all carry. Both carry the ethical instinct to life even though they produce conflicting views of what we should do. Somehow water forces us to go deeper than familiar adversarial positions and confront what we really share - this instinct to life.

Water can be a superordinate ethic or value, the appeal to which, is capable of coalescing conflicting interests and facilitating consensus building within and among societies. The symbolic content of water as cleansing, healing, rebirth and reconciliation can provide a powerful tool for cooperation and symbolic acts of reconciliations so necessary to conflict resolution in other areas of society. In a sense, negotiations over water use, itself, could be seen as a secular and ecumenical ritual of reconciliation and creativity

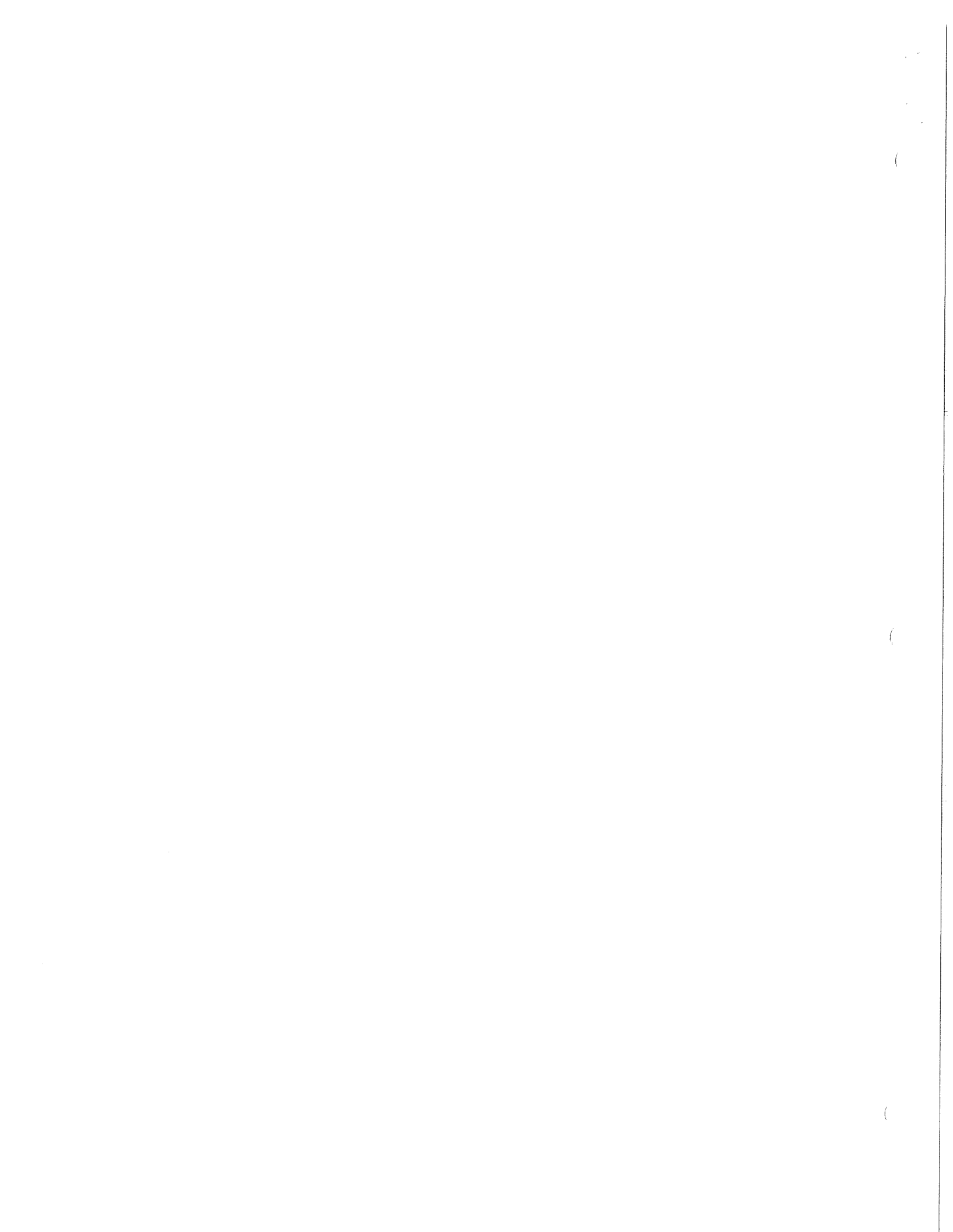
In a world of increasing austerity and in an international system where incentives are crucial because of the lack of international enforcement mechanisms; what are the ethical guidelines for international lenders and donors, especially regarding the conditioning of water resources lending on cooperation among stakeholders among and within countries?

Sixth: Toward a New Ethics for Freshwater Water Management

I agree with others that we need ethics to help guide water resources management into the next century. As Gleick and others note, we must make a commitment to: provide for basic water needs; to provide for basic water needs to maintain ecosystems; to set and maintain minimum water quality standards; to minimize or not impair the renewability of freshwater stocks and flows; to better and more accessible water data; to prevent and manage water conflicts peacefully, and; to make all aspects of water management more participatory.¹⁰

In the longer run, we need an ethic which helps to bring a new balance around water decisions; an ethic that helps us guard against “gigantism” and “technological triumphalism” on the one hand but equally important, against an unwarranted reverence to over romanticized past and a “technophilia.”

Here are three elements for such an ethic.



First, the new ethic we require is not simply one of preservation. It is one that should be built teleologically; on a sense of purpose and on an active co-designing with nature. Even restoration and preservation have come to mean conscious intervention (or I prefer to say partnerships) with nature. We are intervening to create or to re-create some preferred state or equilibrium; whether that preference comes from a vision of the future or from romantic notions of the past. Nature and our ecology are not static. Nature's destruction to nature can be greater than anything that humans could dream up. Look at the results of floods or volcanoes and their impact on the atmosphere.

Second, a new ethic must be based on a balance between humans and technology and among structural and non-structural approaches. Rarely have either worked alone and it is time to stop characterization them: one versus the other.

Third, a new ethic, even in our advanced technological age, should be based on finding a new balance of the sacred and utilitarian in water. We need to rebalance the sanctity and utilitarian; the rational and emotional; in water resources management. Water resources managers need to understand the wisdom encoded in traditional religious and secular symbols and rituals surrounding water

Throughout history, water has been treated as an end and as a means. In truth it is both. When water appears plentiful it is easier to think of it as a means. In arid areas this is less likely and water is more likely to become an organizing principle for society. If thought of as a means, it is easy to see water as a factor of production and in utilitarian terms. But as an end water often takes on a sanctity and value beyond utilitarian exchange.

The sacred refers to those aspects of water through which mystery and unknown, or some would say the irrational, elements become present to our awareness.¹¹ But, talking of such a balance does not mean returning to a neo-paganism or to a pantheism or any other "ism." It does not mean that water should be made a religion. But, it is to appreciate the intrinsic and broad value of water that is not captured in traditional utilitarian calculus of transactions. It is to recognize that water is not only a means to other goals, it is also important as an end in itself.

Balancing the sacred and utilitarian in water is not new; although our era's balance point is. From the ancients respect for sanctity of water, to Thales' and Hippocratic notions of water as source of life, to the Christian fathers notions of water as producer of life, to Herodotus' inventing geometry to predict flooding on the Nile, to Mayan, Khmer and other priests who intervened into the uncertainties of planting and harvesting, to the Renaissance Fontianeri's (men who combined knowledge of hydraulics, physics, science and hydro - mythology), to 19th century technologies "conquest" and democratization of water; humans have been constantly rebalancing the sanctity and utilitarian in water.

Conclusion



Today, our technology tells us that there is enough water - if we cooperate. One of the most important elements for cooperation is something negotiations experts call superordinate values. These are values beyond immediate utilitarian values to which competing parties can identify. Rekindling the sense of sacred in water, a superordinate value, is one way to facilitate the escalation of debate on water cooperation to higher levels and thus impact the capacity to reach cooperation and to manage conflict. This balancing is not new: it is what we humans have been doing throughout history as we constantly learn how to deal with environmental uncertainty.

ENDNOTES

1. Colin Ward, Reflected in Water: A Crisis of Social Responsibility, Cassell, London, 1997, p.32.
2. See, Peter H. Glick, The World's Water, The Biennial report on Freshwater Resources, Island Press, Washington, D.C., 1998, page 42.
3. Peter Rogers, "Integrating Water Resources Management with Economic and Social Development," paper presented to Expert Group meeting, Harare, Zimbabwe, January 1998.
4. Op. Cit., Postel, p. 108.
5. For background on the principles see, William J. Byron, "Ten Building Blocks of Catholic Social Teaching," America, October, 31, 1998.
6. For example, see Glick, op. cit., p.18.
7. O.P. Dwivedi, "Satyagraha for Conservation: Awakening the Spirit of Hinduism," in Gottlieb, 1996, p.157.
8. Mawil Y. Izzi Deen, "Islamic Environmental Ethics: Law and Society," in Gottlieb, 1996, p.164.
9. Chapter 6, in Tony Allen.
10. Op. Cit. Glick, The World's Water 1998, page 19.
11. John F. Haught, "Christianity and Ecology," in This Sacred Earth: Religion, Nature, Environment, ed. Roger S. Gottlieb, Routledge, New York, 1996, p. 277.

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STATE OF ALASKA INSTREAM FLOW STATUTES AND REGULATIONS

Sec. 46.15.035. Appropriation or removal of water out of hydrologic units to other hydrologic units; water conservation fee; reservation of water for fish.(a) Water may not be removed from the hydrologic unit from which it was appropriated to another hydrologic unit, inside or outside the state, without being returned to the hydrologic unit from which it was appropriated nor may water be appropriated for removal from the hydrologic unit from which the appropriation is sought to another hydrologic unit, inside or outside the state, without the water being returned to the hydrologic unit from which it is to be appropriated, unless the commissioner

(1) finds that the water to be removed or appropriated for removal is surplus to needs within the hydrologic unit from which the water is to be removed or appropriated for removal, including fishing, mining, timber, oil and gas, agriculture, domestic water supply, and other needs as determined by the commissioner;

(2) finds that the application for removal or appropriation for removal meets the requirements of AS 46.15.080 ; and

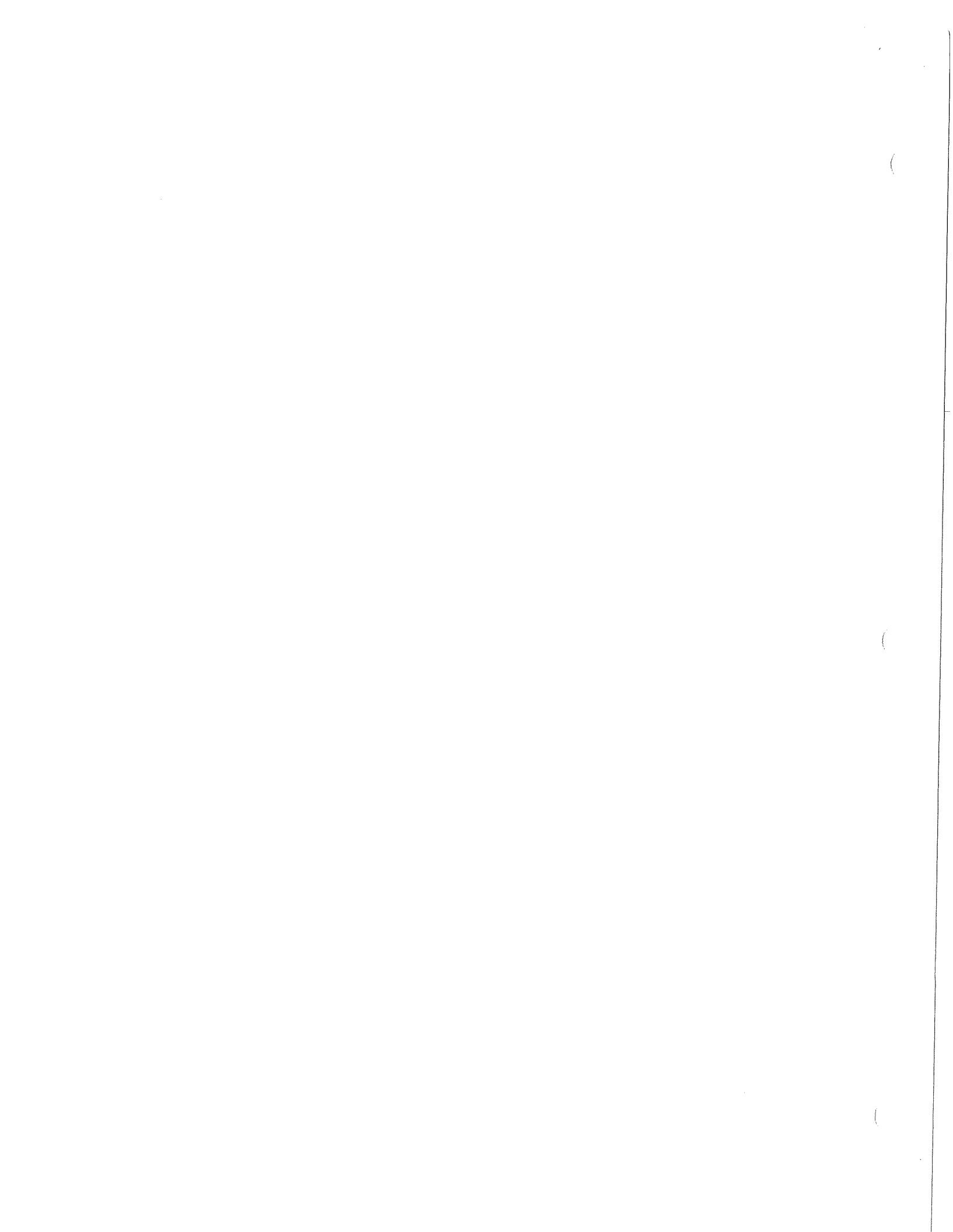
(3) assesses a water conservation fee under (b) of this section.

(b) The commissioner shall establish, by regulation, a water conservation fee for a use of water in which the water is removed from the hydrologic unit from which it was appropriated to another hydrologic unit inside or outside the state, without the water being returned to the hydrologic unit from which it was appropriated. The fee established under this subsection shall be graduated to encourage the conservation of water.

(c) Except as provided in AS 46.15.090 , and in addition to the requirements of (a) of this section, the commissioner may approve an application for removal or permit an appropriation for removal under (a) of this section of water from a lake, river, or stream that is used by fish for spawning, incubation, rearing, or migration, or ground water that significantly influences the volume of water in a lake, river, or stream that is used by fish for spawning, incubation, rearing, or migration, only if the commissioner reserves a volume of water in the lake or an instream flow in the river or stream for the use of fish and to maintain habitat for fish. The commissioner may adjust the volume of water reserved under this subsection if the commissioner, after public notice and opportunity to comment and with the concurrence of the commissioner of fish and game, finds that the best interests of the state are served by the adjustment. A reservation under this subsection

(1) of a volume of water or an instream flow for the use of fish and to maintain habitat for fish that is reserved under this section is withdrawn from appropriation;

(2) for fish from a lake, river, or stream, identified under AS 16.05.870 or identified in a Department of Fish and Game regional guide as being used by fish for spawning, incubation, rearing, or migration on or before the effective date of this section, has a priority date as of the effective date of this section;



(3) of water does not apply to an application for removal or appropriation for removal under AS 46.15.040 for nonconsumptive uses of water or for single family domestic use;

(4) is not subject to AS 46.15.145 ;

(5) of water does not apply to appropriations of ground water of 5,000 gallons or less a day unless the commissioner, in consultation with the Department of Fish and Game, determines that the appropriation may adversely affect fish habitat in a lake, river, or stream; the commissioner shall consider multiple appropriations of water for a single related use as a single appropriation for the purposes of this subsection.

(d) With respect to rivers and streams described in (c) of this section, the instream flow reservation shall be limited to the portion of the stream, including tributaries to the stream, at and downstream of the point of diversion or withdrawal. With respect to lakes described in (c) of this section, the reservation shall be limited to the lake from which the diversion or withdrawal is made, and the outlet and tributaries to the outlet flowing downstream.

(e) In this section,

(1) "fish" means a species of anadromous or freshwater fish that may be taken under regulations of the Board of Fisheries;

(2) "hydrologic unit" means a hydrologic subregion established by the United States Department of the Interior, Geological Survey, on the "Hydrologic Unit Map-1987, State of Alaska."

Sec. 46.15.037. Sale of water by the state.

(a) The commissioner may provide for the sale of water by the state if

(1) the water has first been appropriated to the state in accordance with the requirements of this chapter; and

(2) the commissioner determines that

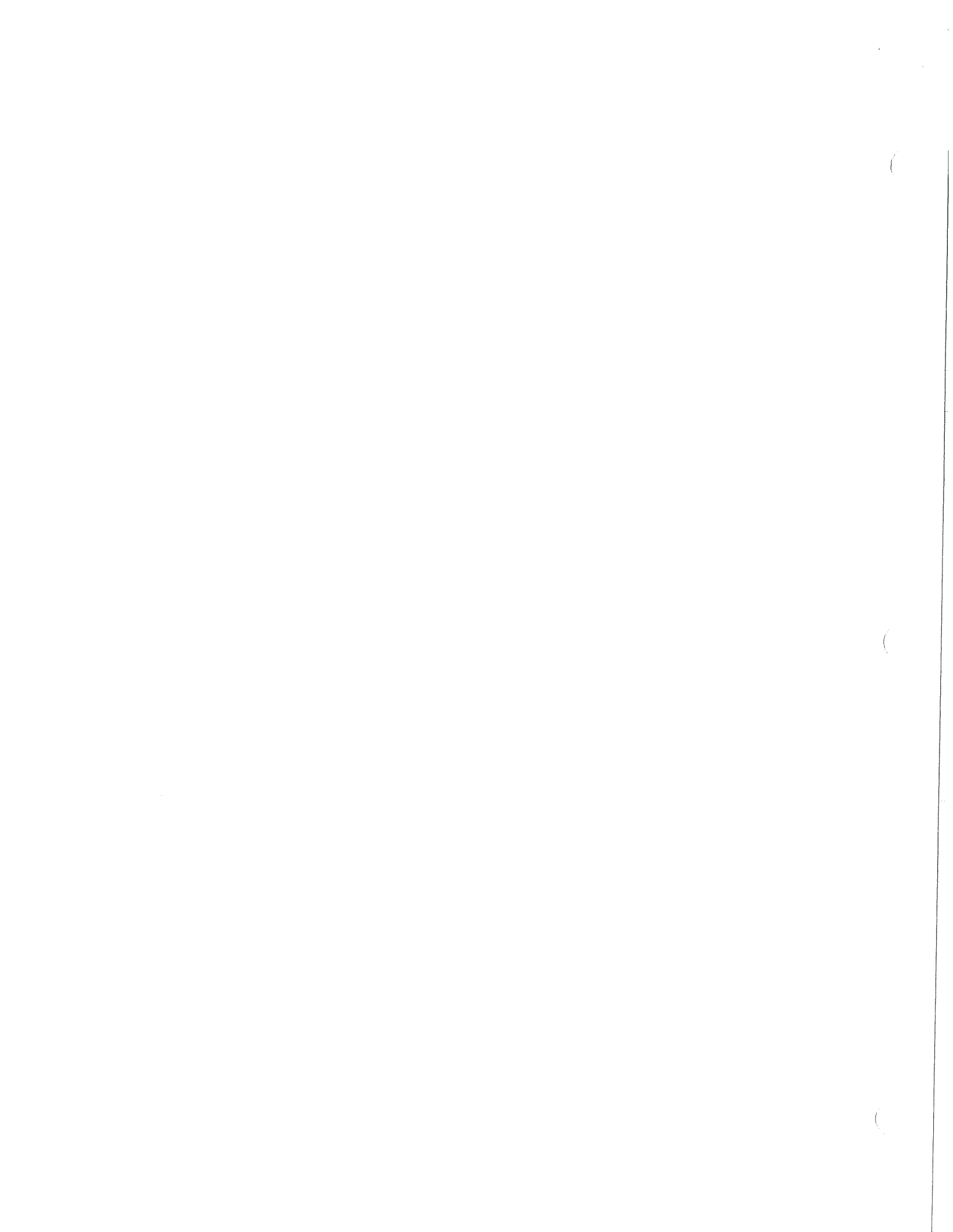
(A) the water is surplus to needs within the hydrologic unit from which it was appropriated, including fishing, mining, timber, oil and gas, agriculture, domestic water supply, and other needs as determined by the commissioner;

(B) the proposed sale of the water meets the requirements of AS 46.15.080; and

(C) the sale price of the water is based upon the fair market value of the water.

(b) A purchaser of water from the state under this section shall acquire only those contractual rights to the water set out in sale documents prepared by the commissioner except that a sale of water by the state does not constitute an appropriation of water under this chapter to the purchaser.

(c) If water to be sold by the state under (a) of this section, is to be removed from the hydrologic unit from which it was appropriated to another hydrologic unit, inside or outside the state, without being returned to the hydrologic unit from which it was



appropriated, the commissioner may not sell the water unless the sale meets the requirements of (a)(2) of this section, a water conservation fee is assessed under AS 46.15.035, and, if the water to be sold is from a lake, river, or stream that is used by fish for spawning, incubation, rearing, or migration, or ground water that significantly influences the volume of water in a lake, river, or stream that is used by fish for spawning, incubation, rearing, or migration, the commissioner reserves a volume of water in the lake or an instream flow in the river or stream for the use of fish and to maintain habitat for fish. The commissioner may adjust the volume of water reserved under this subsection if the commissioner, after public notice and opportunity to comment and with the concurrence of the commissioner of fish and game, finds that the best interests of the state are served by the adjustment. A reservation under this subsection

(1) of a volume of water or an instream flow for the use of fish and to maintain habitat for fish that is reserved under this section is withdrawn from appropriation;

(2) for fish from a lake, river, or stream, identified under AS 16.05.870 or identified in a Department of Fish and Game regional guide as being used by fish for spawning, incubation, rearing, or migration on or before July 1, 1992, has a priority date as of July 1, 1992;

(3) is not subject to AS 46.15.145;

(4) of water does not apply to appropriations under this section of ground water of 5,000 gallons or less a day unless the commissioner, in consultation with the Department of Fish and Game, determines that the appropriation may adversely affect fish habitat in a lake, river, or stream; the commissioner shall consider multiple appropriations of water for a single related use as a single appropriation for the purposes of this subsection.

(d) With respect to rivers and streams described in (c) of this section, the instream flow reservation shall be limited to the portion of the stream, including tributaries to the stream, at and downstream of the point of diversion or withdrawal. With respect to lakes described in (c) of this section, the reservation shall be limited to the lake from which the diversion or withdrawal is made, and the outlet and tributaries to the outlet flowing downstream.

(e) In this section,

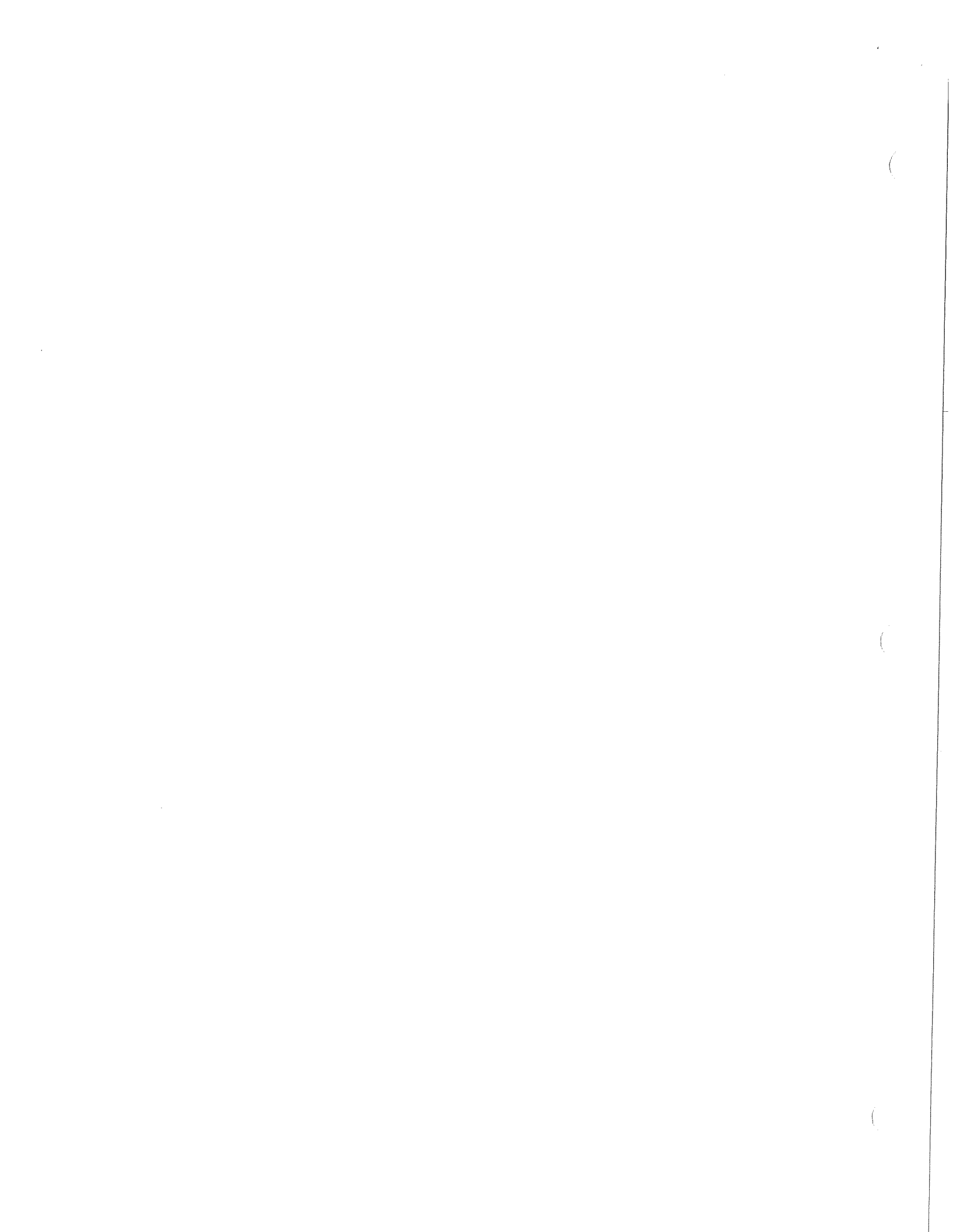
(1) "fish" means a species of anadromous or freshwater fish that may be taken under regulations of the Board of Fisheries;

(2) "hydrologic unit" has the meaning given in AS 46.15.035 (e).

(f) The commissioner may not provide for the sale of salt water under this section.

Sec. 46.15.080. Criteria for issuance of permit.

(a) The commissioner shall issue a permit if the commissioner finds that



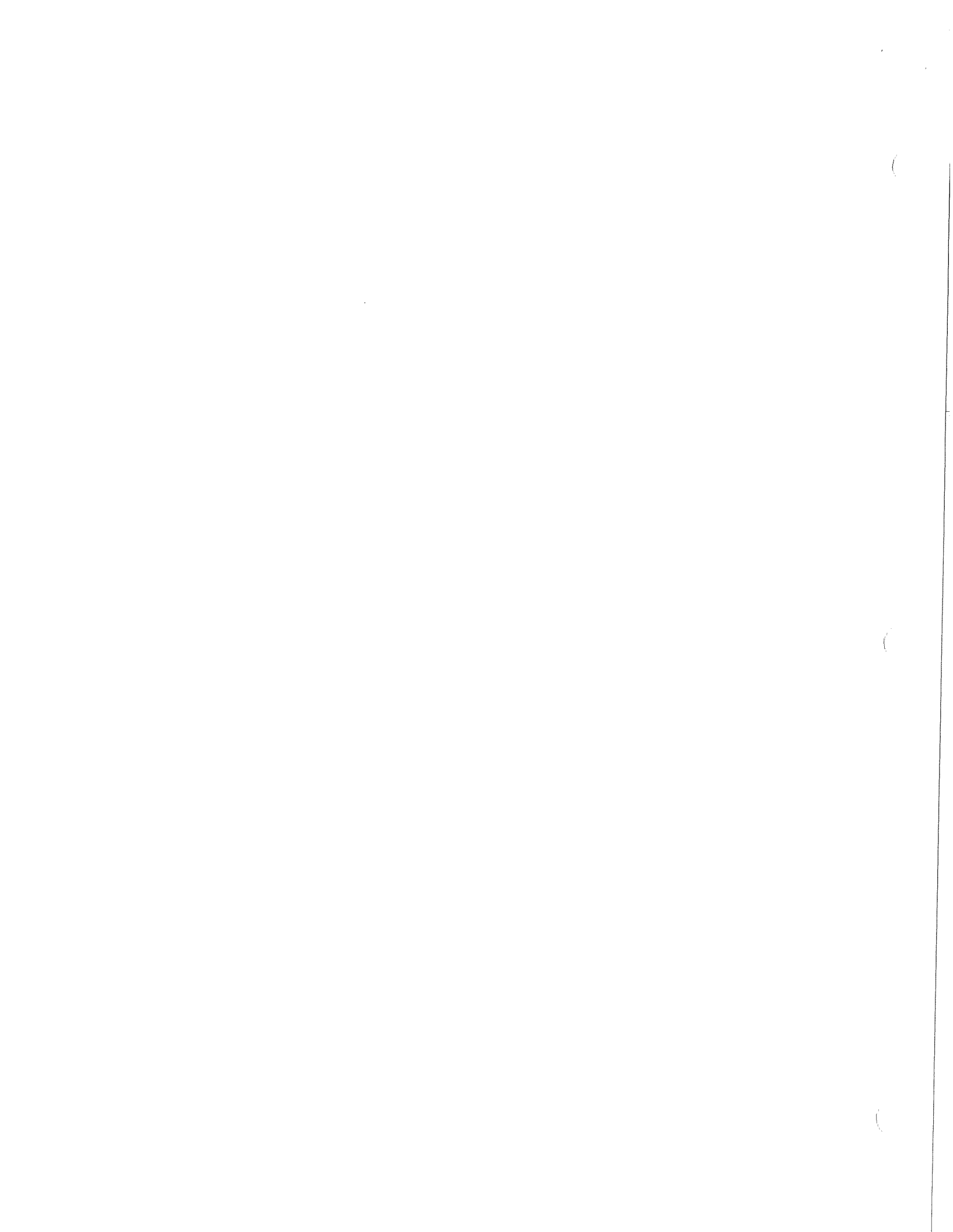
- (1) rights of a prior appropriator will not be unduly affected;
 - (2) the proposed means of diversion or construction are adequate;
 - (3) the proposed use of water is beneficial; and
 - (4) the proposed appropriation is in the public interest.
- (b) In determining the public interest, the commissioner shall consider
- (1) the benefit to the applicant resulting from the proposed appropriation;
 - (2) the effect of the economic activity resulting from the proposed appropriation;
 - (3) the effect on fish and game resources and on public recreational opportunities;
 - (4) the effect on public health;
 - (5) the effect of loss of alternate uses of water that might be made within a reasonable time if not precluded or hindered by the proposed appropriation;
 - (6) harm to other persons resulting from the proposed appropriation;
 - (7) the intent and ability of the applicant to complete the appropriation; and
 - (8) the effect upon access to navigable or public water.

Sec. 46.15.145. Reservation of waer.

(a) The state, an agency or a political subdivision of the state, an agency of the United States or a person may apply to the commissioner to reserve sufficient water to maintain a specified instream flow or level of water at a specified point on a stream or body of water, or in a specified part of a stream, throughout a year or for specified times, for

- (1) protection of fish and wildlife habitat, migration, and propagation;
- (2) recreation and park purposes;
- (3) navigation and transportation purposes; and
- (4) sanitary and water quality purposes.

(b) Upon receiving an application for a reservation under this section, the commissioner shall proceed in accordance with AS 46.15.133.



(c) The commissioner shall issue a certificate reserving the water applied for under this section if the commissioner finds that

(1) the rights of prior appropriators will not be affected by the reservation;

(2) the applicant has demonstrated that a need exists for the reservation;

(3) there is unappropriated water in the stream or body of water sufficient for the reservation; and

(4) the proposed reservation is in the public interest.

(d) After the issuance of a certificate reserving water, the water specified in the certificate shall be withdrawn from appropriation and the commissioner shall reject an application for a permit to appropriate the reserved water.

(e) A reservation under this section does not affect rights in existence on the date the certificate reserving water is issued.

(f) At least once each 10 years the commissioner shall review each reservation under this section to determine whether the purpose described in (a) of this section for which the certificate reserving water was issued and the findings described in (c) of this section still apply to the reservation. If the commissioner determines that the purpose, or part or all of the findings, no longer apply to the reservation, the commissioner may revoke or modify the certificate reserving the water after notice, hearing when appropriate, and a written determination that the revocation or modification is in the best interests of the state.

REGULATIONS

11 AAC 093.146. Issuance of a Certificate of Reservation of Water.

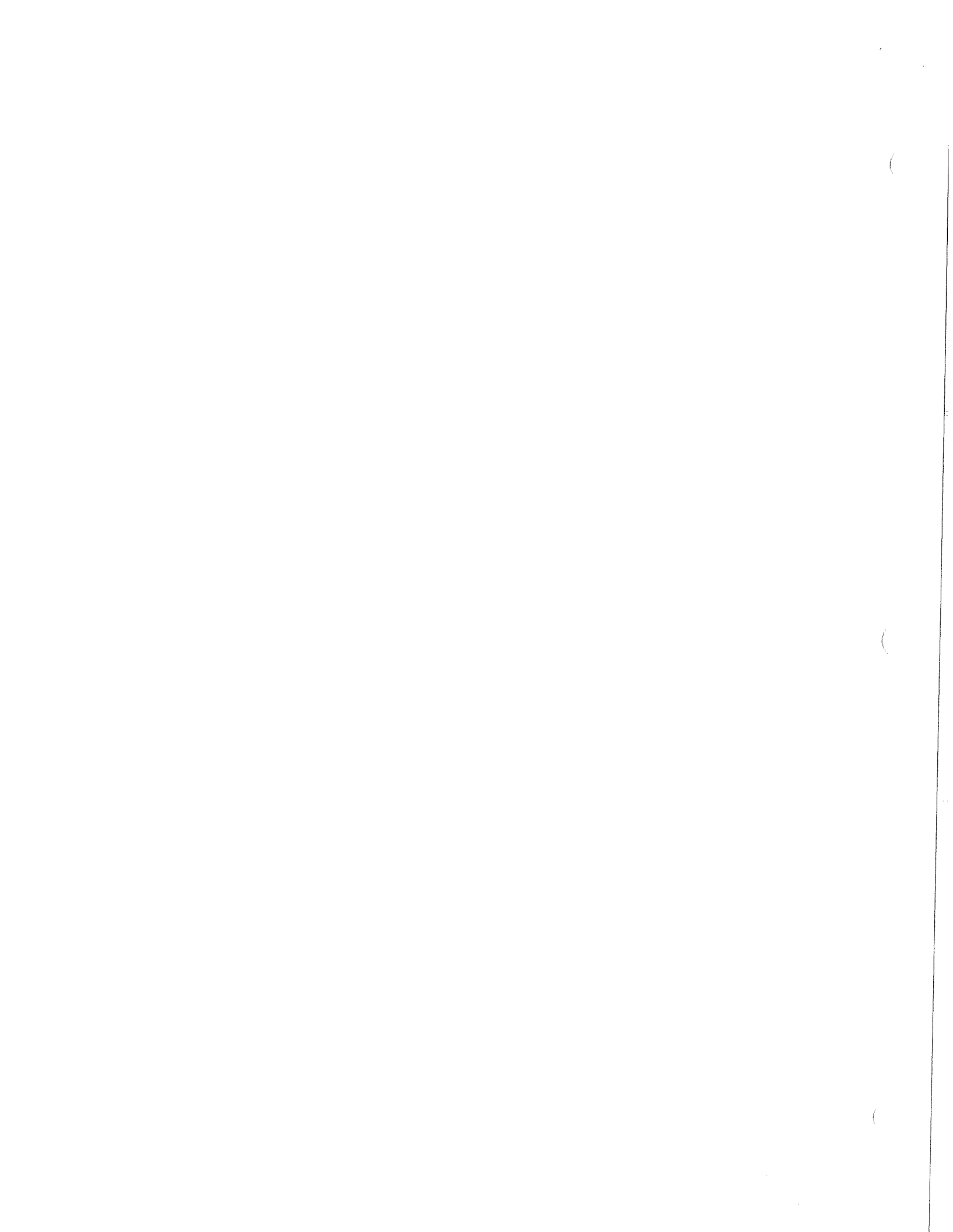
(a) The commissioner will issue a certificate of reservation of water if the commissioner finds that the reservation meets the requirements of AS 46.15.145.

(b) The certificate of reservation will be issued to the applicant. The applicant is responsible for compliance with the conditions of the certificate of reservation.

(c) A certificate of reservation will contain the following conditions:

(1) the certificate of reservation may not be voluntarily abandoned, conveyed, transferred, assigned, or converted to another use, in whole or in part, unless required as a result of review under 11 AAC 93.147; and

(2) the certificate of reservation does not authorize the certificate holder or any other person to prevent access to, on, or through the water reserved by the certificate, or to prohibit the use of the reserved water for other compatible purposes set out in AS 46.15.145 (a).



(d) The certificate of reservation will state any additional terms or conditions the commissioner considers necessary to protect the prior valid rights of other appropriators and the public interest. The conditions will, in the commissioner's discretion, include the following:

(1) measuring devices of a type and at a location approved by the commissioner must be installed and maintained to monitor and report on the reserved instream flow or level of water; and

(2) the reservation will be reviewed by the commissioner within a specified period of time, if sooner than the 10-year review under 11 AAC 93.147.

(e) The priority of a reservation of water is the date the application was accepted by the department for filing.

(f) Nothing in this section constitutes a waiver of the responsibility of the applicant to secure any appropriate state, federal, or local regulatory permits or licenses with regard to the stream or water body affected.

Eff. 9/11/83, Register 87; am 11/7/90, Register 116.

Authority:

AS 46.15.010

AS 46.15.020

AS 46.15.080

AS 46.15.120

AS 46.15.145

11 AAC 093.147. Review of Reservation of Water.

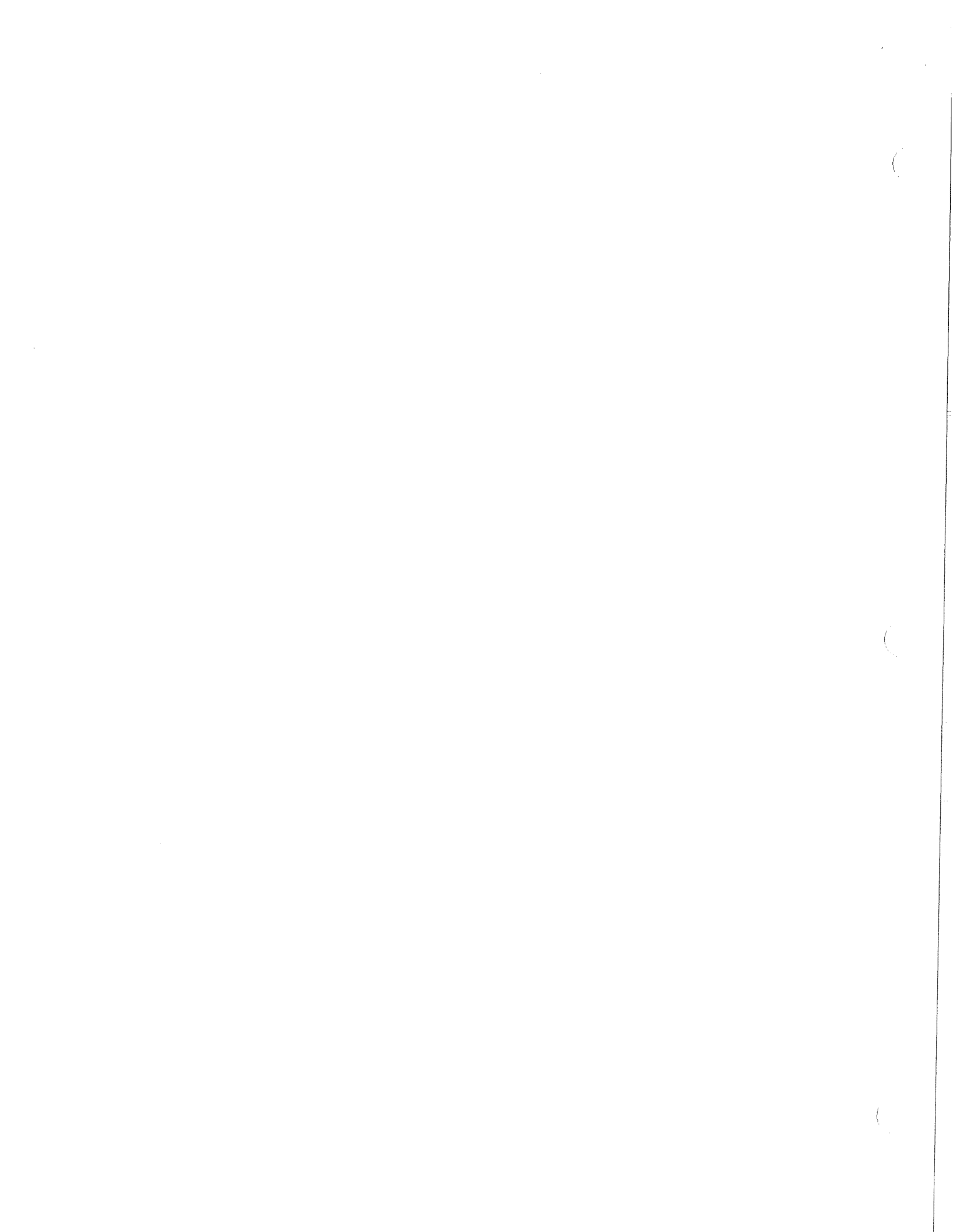
(a) The commissioner will review a reservation of water at least once each 10 years after the date of issuance of the certificate of reservation. The commissioner will, in his or her discretion, review a reservation of water in fewer than 10 years if circumstances warrant a review. These circumstances might include

(1) a condition on the certificate of reservation requiring an earlier review, under 11 AAC 93.146(d)(2);

(2) a significant change affecting the water resource;

(3) a subsequent applicant's protest of the justification for the reservation of water if water might be unavailable to both maintain the reservation of water and to grant the applicant's request; or

(4) a written request by the certificate holder to the department, seeking authority to abandon, convey, transfer, assign, or convert the certificate of reservation to another use.



- (b) Upon review of a reservation of water, the commissioner will determine
- (1) if the purpose for the reservation still applies;
 - (2) if the need for the reservation still exists;
 - (3) the effects of the reservation on prior appropriators;
 - (4) the effects of the reservation on the public interest;
 - (5) repealed 11/7/90;
 - (6) if additional physical, biological, water chemistry, and socio-economic data or reports concerning the reservation are available;
 - (7) if the quantity or level of water reserved is adequate for the purposes of the reservation;
 - (8) if the daily duration and months of the year of the reservation still apply; and
 - (9) if additional research, data collection, and analysis should be conducted, or different methodologies employed for reviewing the reservation.

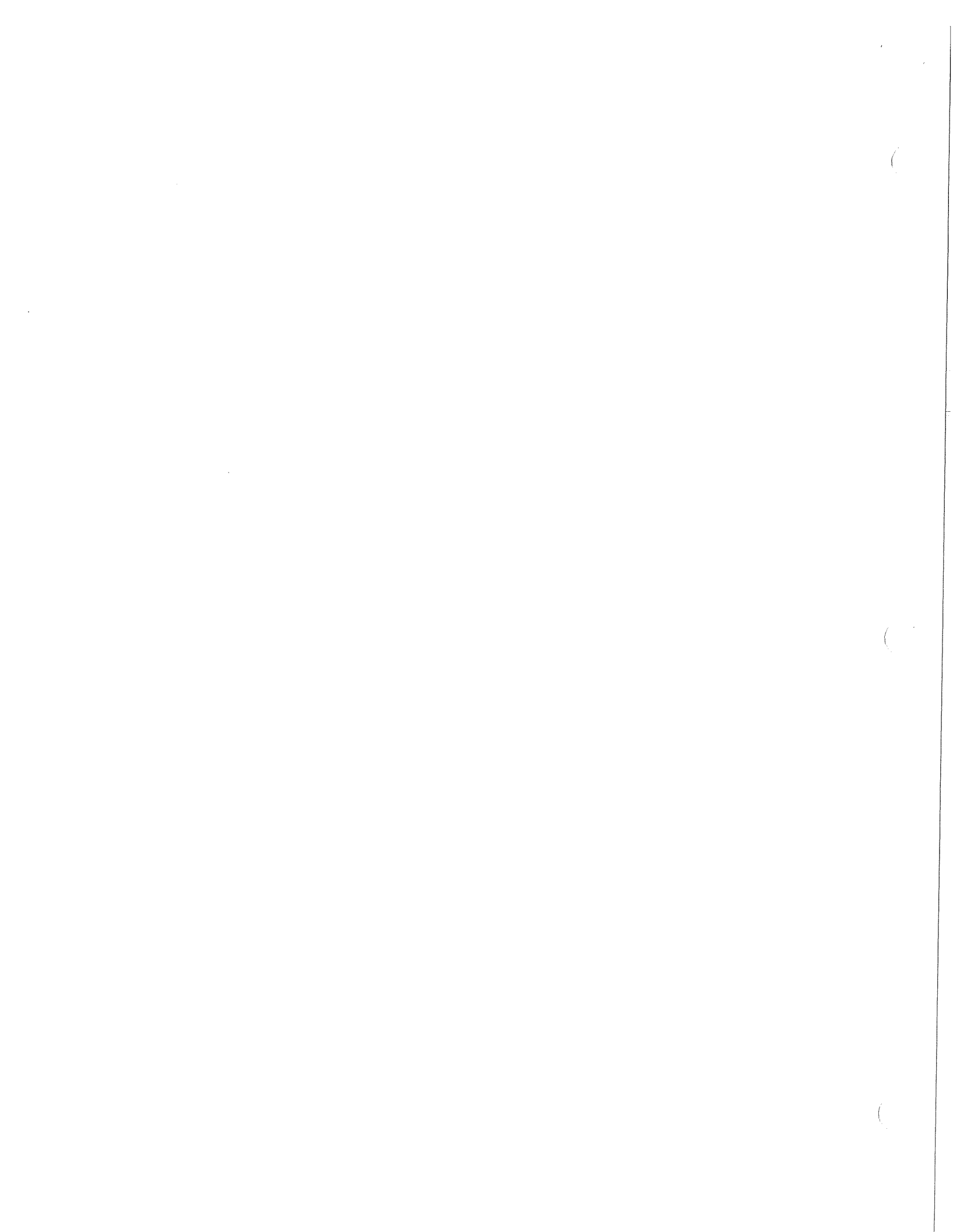
(c) The commissioner will, in his or her discretion, require that additional research, data collection, and analysis be conducted or different methods used for reviewing the reservation of water. Costs of conducting additional research, data collection, and analysis, and of using a different methodology will be borne by the protestant if a protest regarding the reservation has been filed with the department. In other cases, these costs will be borne by the state. If the certificate holder desires expedited review, the commissioner will, in his or her discretion, require the certificate holder to bear the costs.

(d) The commissioner will provide written notice, as provided in 11 AAC 93.145(a), of a review of a reservation of water in order to solicit information that might be pertinent to the review. The commissioner will, in his or her discretion, hold a hearing on the review of a reservation of water.

(e) In accordance with the procedural requirements of 11 AAC 93.940, the commissioner will determine whether the purpose for the reservation of water, and his or her original findings of fact in granting the reservation, have been significantly altered by subsequent events. If the purpose of the reservation or all or part of the findings in granting the reservation no longer apply to the reservation, the commissioner will, in his or her discretion, amend the certificate of reservation or revoke all or part of it in accordance with AS 46.15.145 (f) and 11 AAC 93.940. The commissioner's final decision to amend or revoke all or part of a certificate of reservation will be summarized by written findings of fact and conclusions of law. The commissioner will record any amended certificate of reservation in the appropriate recorder's office.

Eff. 9/11/83, Register 87; am 11/7/90, Register 116.

Authority:



AS 46.15.020

AS 46.15.140

AS 46.15.145

11 AAC 005.10. Fees.

(a) Non-refundable fees to apply for authorizations, and fees to obtain publications or services from the department, are as follows:

(8) water management

(P) the water conservation fee for water appropriated or to be appropriated in accordance with AS 46.15.040 and removed from a hydrologic unit in accordance with AS 46.15.035 is as follows and applies to the total quantity of water appropriated or removed within a calendar year, by a person, as defined in AS 46.15.260 , or a combination of related persons:

(i) \$3 per acre-foot per year for any appropriation of a significant amount of water up to 5,000 acre-feet, or for any other significant amount of water, as defined in 11 AAC 93.970, with a minimum fee of \$ 50;

(ii) \$6 per acre-foot per year for more than 5,000 and up to 15,000 acre-feet;

(iii) \$8 per acre-foot per year for more than 15,000 and up to 25,000 acre-feet;

(iv) \$12 per acre-foot per year for more than 25,000 and up to 50,000 acre-feet;

(v) \$15 per acre-foot per year for more than 50,000 and up to 100,000 acre-feet;

(vi) \$18 per acre-foot per year for more than 100,000 and up to 150,000 acre-feet;

(vii) \$21 per acre-foot per year for more than 150,000 and up to 300,000 acre-feet;

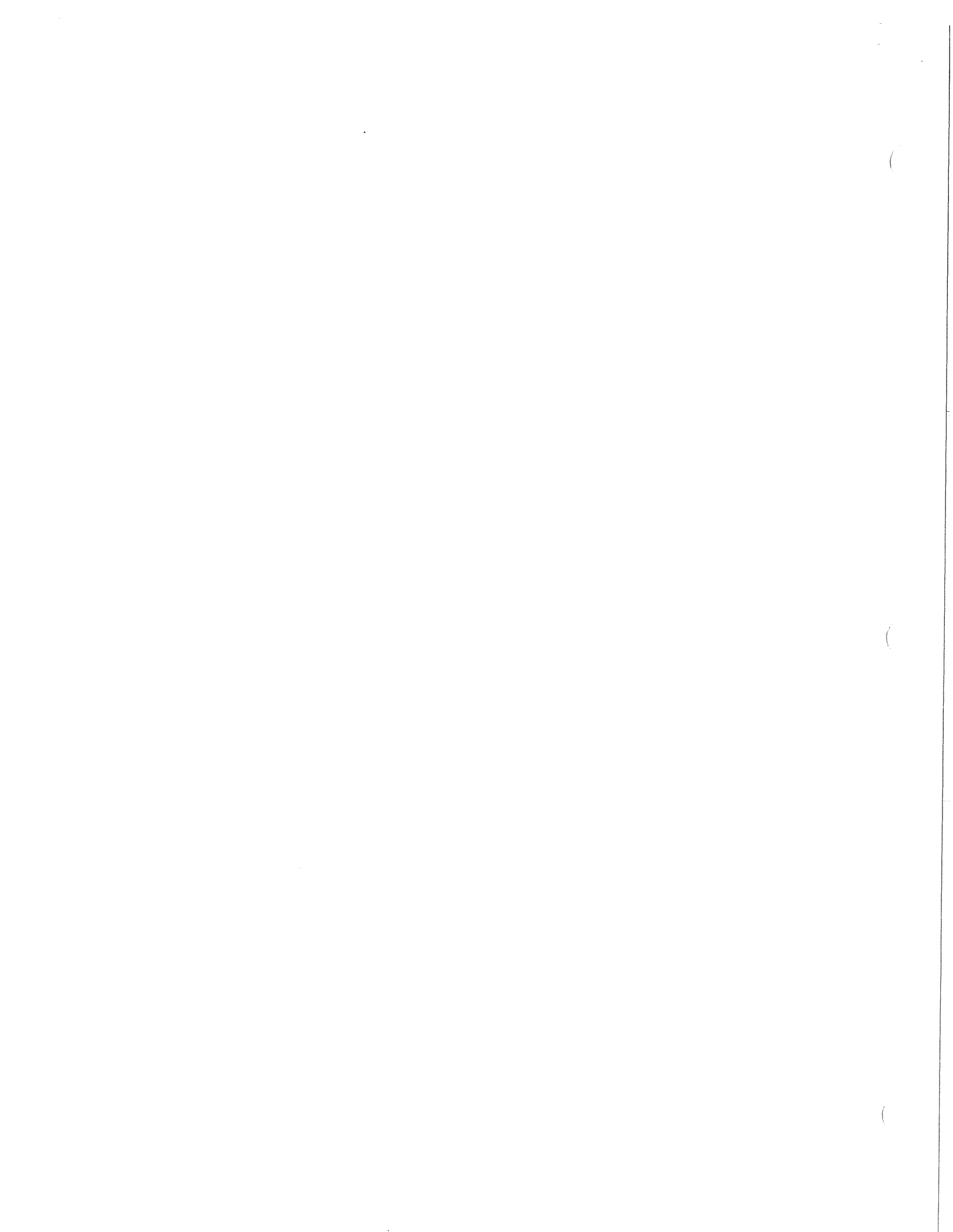
(viii) \$24 per acre-foot per year for more than 300,000 and up to 500,000 acre-feet;

(ix) \$27 per acre-foot per year for more than 500,000 and up to 1,000,000 acre-feet; and

(x) \$30 per acre-foot per year for more than 1,000,000 acre-feet;

(Q) the water conservation fee for water purchased from the state and removed from a hydrologic unit in accordance with AS 46.15.037 is as follows and applies to the total quantity of water purchased within a calendar year, by a person, as defined in AS 46.15.260 , or a combination of related persons:

(i) \$2 per acre-foot per year for any water up to 5,000 acre-feet with a minimum fee of \$ 50;



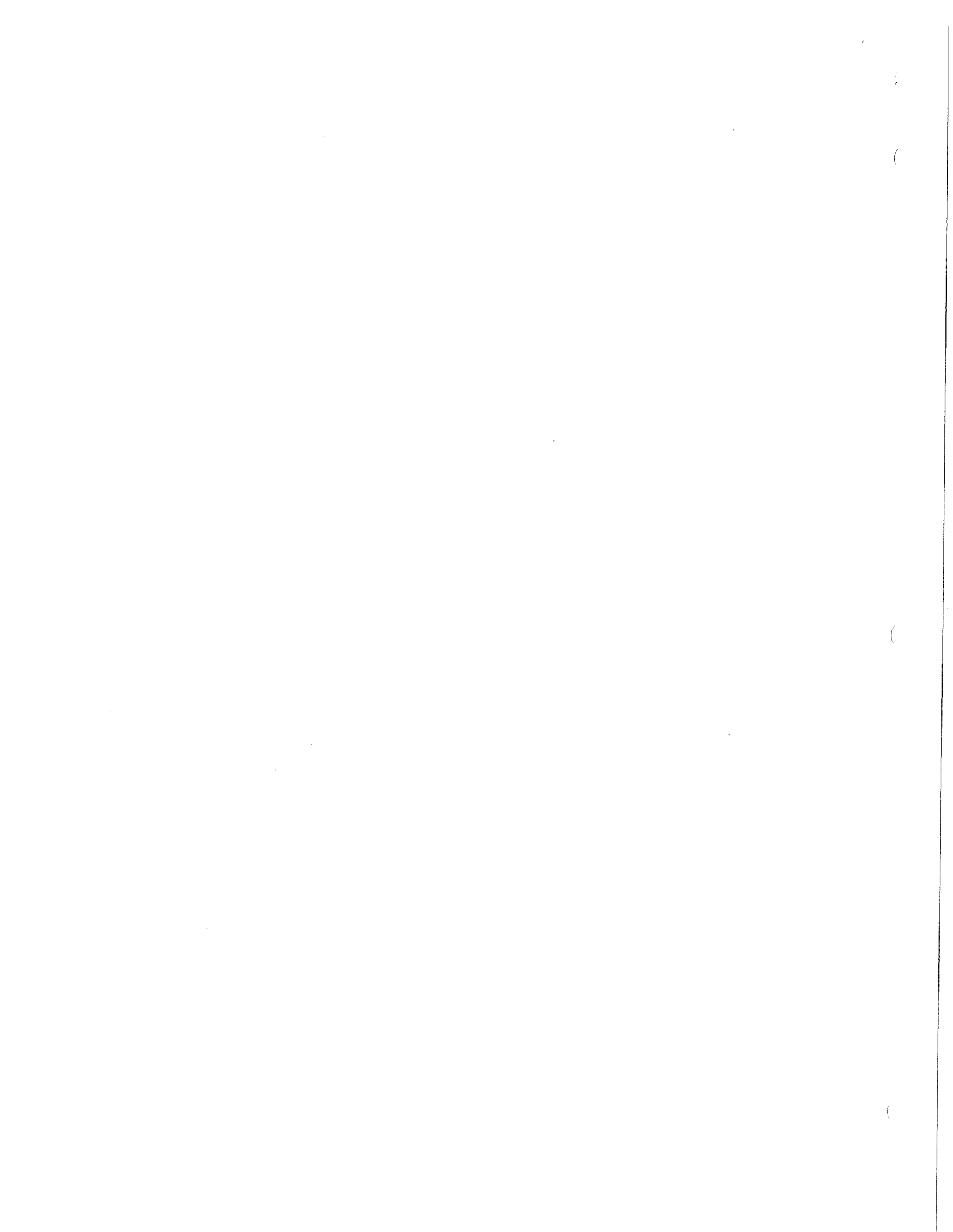
- (ii) \$4 per acre-foot per year for more than 5,000 and up to 15,000 acre-feet;
- (iii) \$6 per acre-foot per year for more than 15,000 and up to 25,000 acre-feet;
- (iv) \$8 per acre-foot per year for more than 25,000 and up to 50,000 acre-feet;
- (v) \$10 per acre-foot per year for more than 50,000 and up to 100,000 acre-feet;
- (vi) \$12 per acre-foot per year for more than 100,000 and up to 150,000 acre-feet;
- (vii) \$14 per acre-foot per year for more than 150,000 and up to 300,000 acre-feet;
- (viii) \$16 per acre-foot per year for more than 300,000 and up to 500,000 acre-feet;
- (ix) \$18 per acre-foot per year for more than 500,000 and up to 1,000,000 acre-feet; and
- (x) \$20 per acre-foot per year for more than 1,000,000 acre-feet;



**Overview of Projects and Proposals
for Redistributing North America's
Freshwater Resources**

**Frank Quinn
Advisor on Water Uses Reference
International Joint Commission
Ottawa**

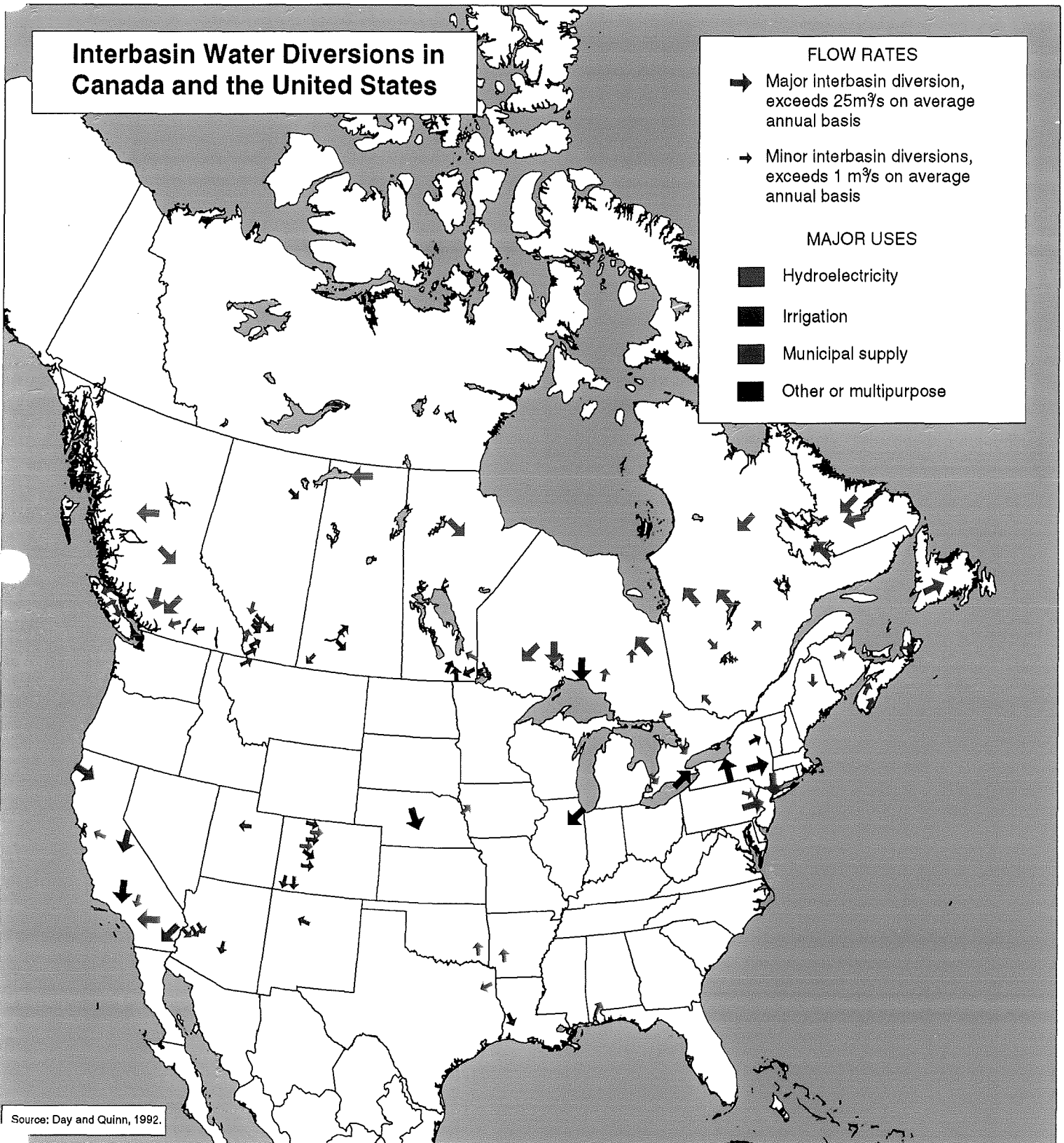
Experts' Workshop
March 30, 1999



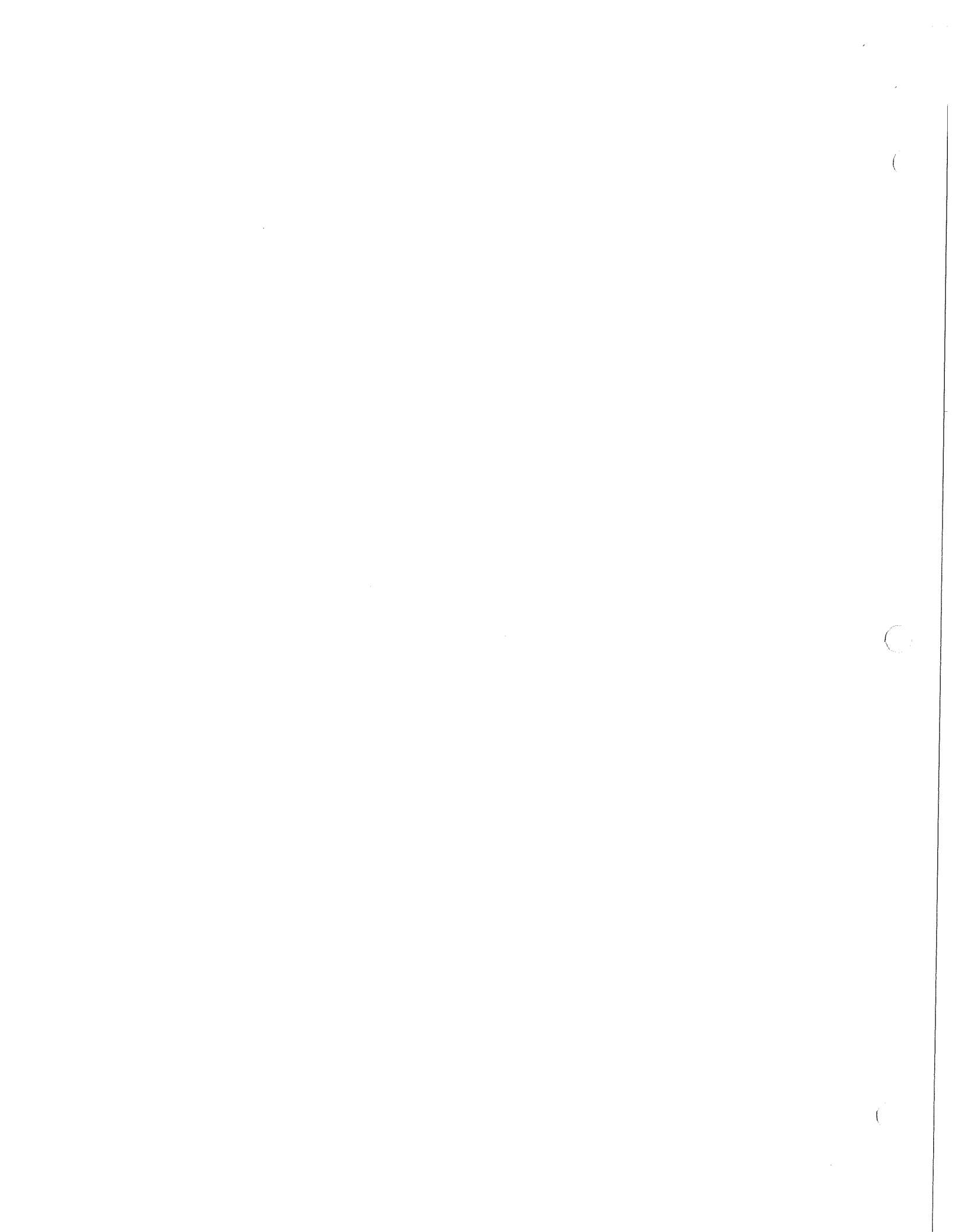
Interbasin Water Diversions in Canada and the United States

- FLOW RATES**
- ➔ Major interbasin diversion, exceeds 25m³/s on average annual basis
 - ➔ Minor interbasin diversions, exceeds 1 m³/s on average annual basis

- MAJOR USES**
- Hydroelectricity
 - Irrigation
 - Municipal supply
 - Other or multipurpose



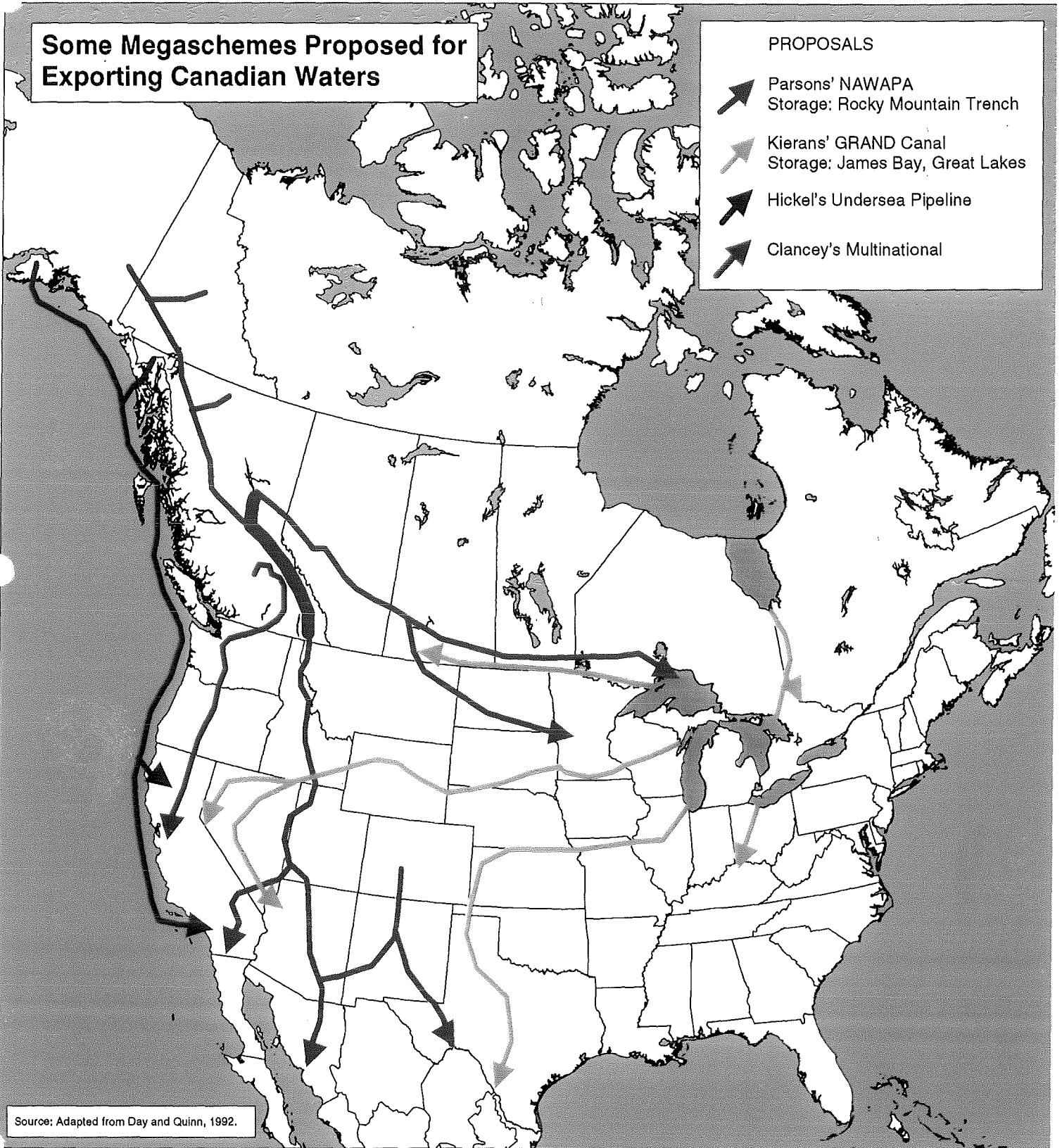
Source: Day and Quinn, 1992.



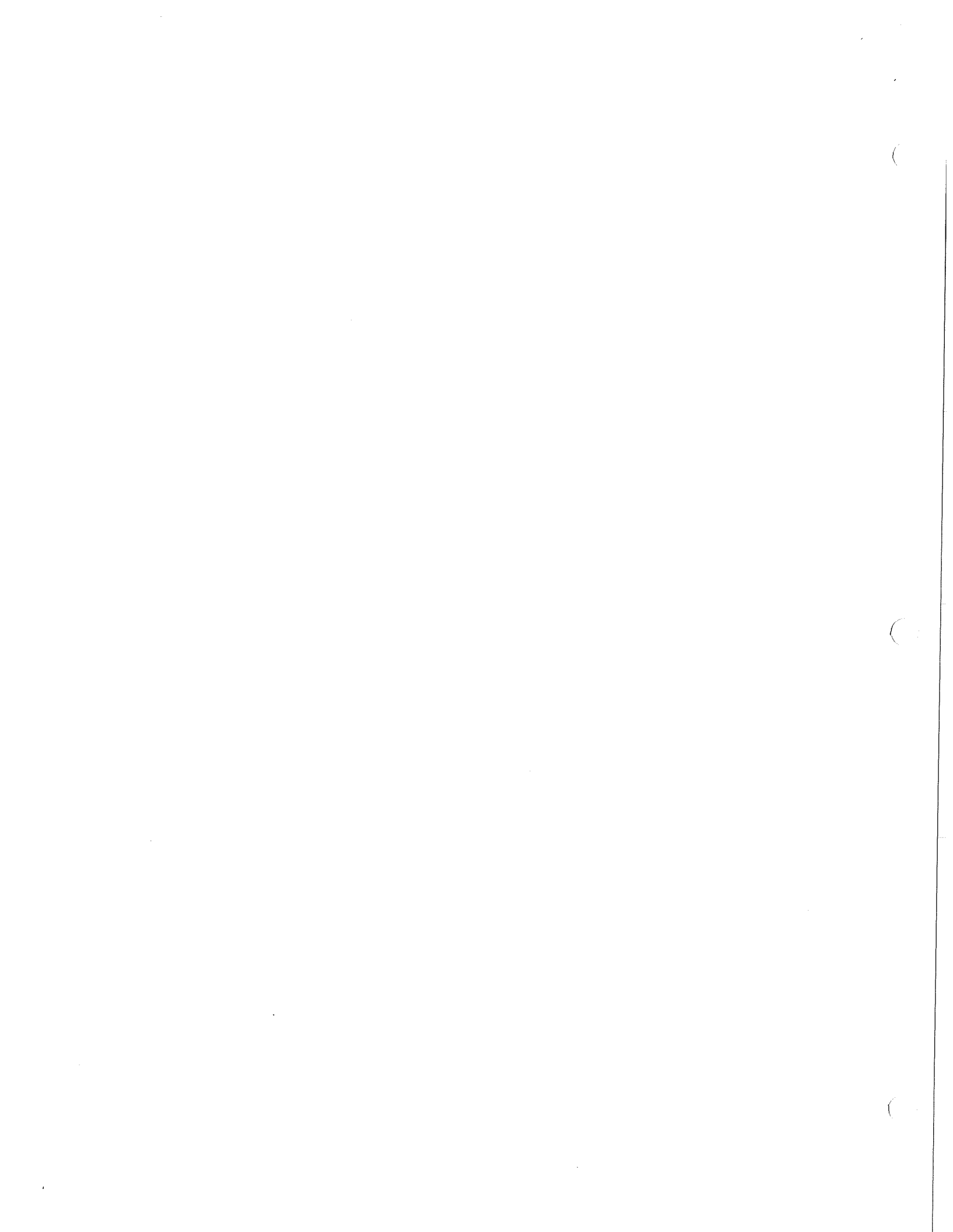
Some Megaschemes Proposed for Exporting Canadian Waters

PROPOSALS

- Parsons' NAWAPA
Storage: Rocky Mountain Trench
- Kierans' GRAND Canal
Storage: James Bay, Great Lakes
- Hicel's Undersea Pipeline
- Clancey's Multinational



Source: Adapted from Day and Quinn, 1992.



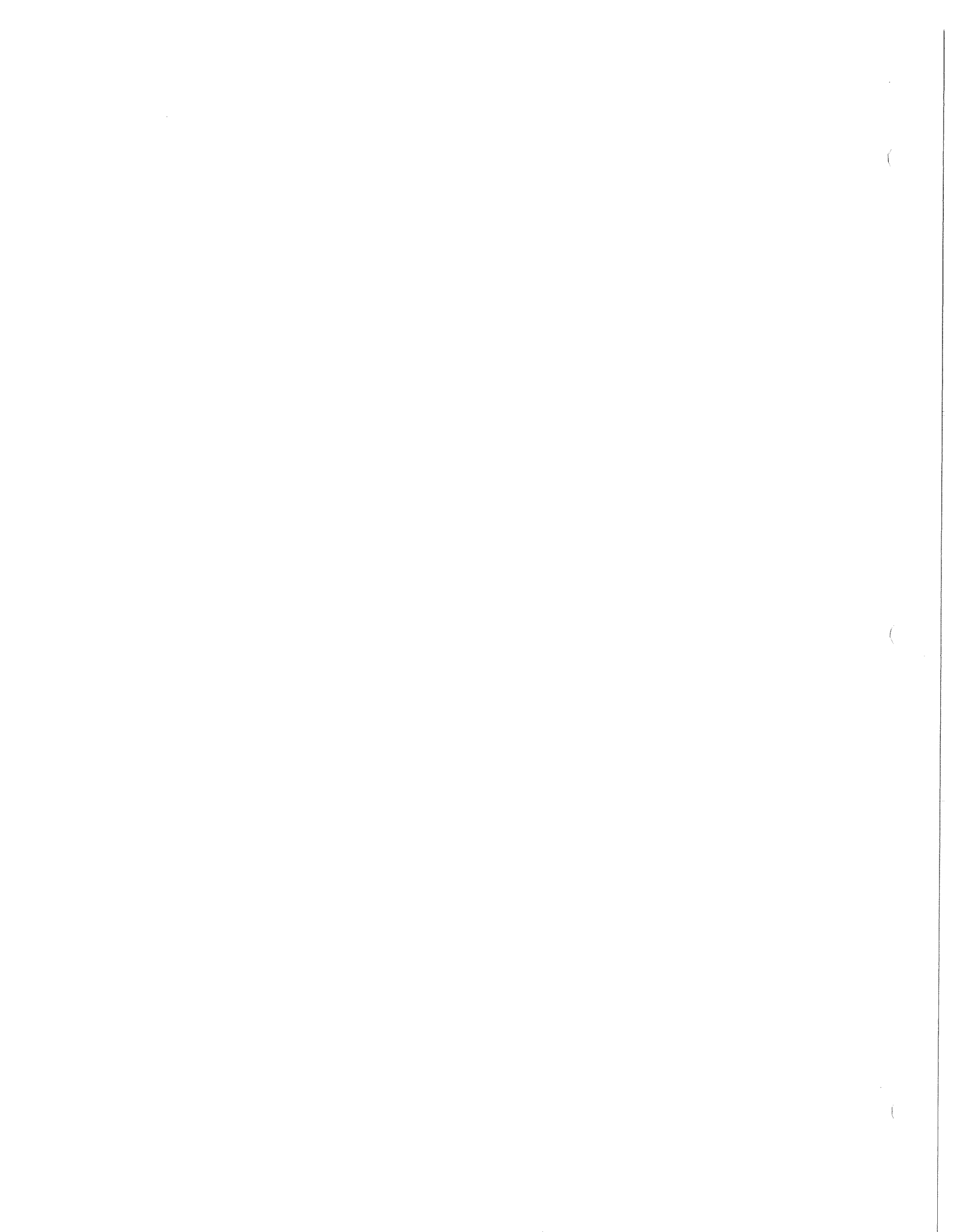
INTERBASIN DIVERSION PROPOSALS - INTERREGIONAL

PROPOSAL (AUTHOR)	YEAR PROPOSED	WATER SOURCE	VOLUME OF DIVERSION IN MILLIONS OF AC. FT.	ESTIMATED COST IN BILLIONS OF \$
Pac. SW. Water Plan (Interior Dept)*	1963	North coastal Calif. Rivers	1.2	?
Western Water Project (Pirkey)	1963	Lower Columbia R. above the Dalles	13.0	12.8
Sierra-Cascade Project (Miller)	1963	Lower Columbia below Bonneville	7.5-30	?
Snake-Colorado Project (Nelson)	1963	Middle Snake R. in Idaho	2.4	1.4
Modified Snake-Colo. Project (Dunn)**	1964	Lower Snake R. in Oregon	5.0	3.6
Yellowstone-Snake-Green Project (Stetson)	1964	Yellowstone & Snake Rivers in Montana & Idaho	2.0	0.4
Undersea Coastal Aqueduct (NESCO)	1965	Mouths of Klamath, Eel & Rogue Rivers	11.0	8.0
Undersea Hose (Conner)	1967	Mouth of Columbia River	12.0	2.0
Great Plains Plan (Beck)	1967	Missouri R. in Nebraska	10.0	3.5
Hudson Institute Plan (Hudson Inst.)	1968	Mississippi & Arkansas Rivers	34.0	12.2
Texas Water Plan (State of Texas)	1968	Mississippi & East Texas Rivers	17.0	9.0
High Plains (Ogallala) Alternatives (CofE)	1982	Missouri and Arkansas Rivers	2-10.0	3.-20.0
Replacement Water for Missouri (Bulkley)	1982	Lake Superior	6.7	27.0
Wyoming Coal Slurry Pipeline	1981	Lake Superior	0.03	?
Undersea Pipeline (Hickel)	1991	Coastal Streams in Alaska	1.2	100.0



INTERBASIN DIVERSION PROPOSALS - INTERNATIONAL

PROPOSAL (AUTHOR)	YEAR PROPOSED	WATER SOURCE	DIVERSION RATE IN M ³ /S	ESTIMATED COST IN BILLIONS OF \$
Grand Canal Plan (Kierans)	1959	James Bay dyked, rivers "recycled" to Great Lakes and beyond.	2,200	100
Great Lakes-Pacific Waterways Plan (Decker)	1963	Skeena, Nechako & Fraser of B.C., Peace, Athabaska, Saskatchewan of Prairie Provinces	4,600	?
North America Water & Power Alliance or NAWAPA (Parsons)	1964	Primarily the Pacific & Arctic drainage of Alaska, Yukon and Brit. Col.; also tributaries of James Bay	6,000	100
Magnum Plan (Magnusson)	1965	Peace, Athabaska & N. Saskatchewan in Alberta	1,000	?
Kuiper Plan (Kuiper)	1967	Peace, Athabaska & N. Saskatchewan in Alberta, Nelson & Churchill in Manitoba	4,000	50
Central North American Water Project or CeNAWP (Tinney)	1967	Mackenzie, Peace, Athabaska, N. Saskatchewan, Nelson & Churchill	6,000	30-50
Western States Water Augmentation Concept (Smith)	1968	Primarily Liard & Mackenzie drainages	1,600	90
NAWAPA-MUSHEC or Mexican-United States Hydroelectric Commission (Parsons)	1968	NAWAPA sources + lower Mississippi & Sierra Madre Oriental Rivers of Southern Mexico	12,000	?
North American Waters, A Master Plan or NAWAMP (Tweed)	1968	Yukon & Mackenzie Rivers, drainage to Hudson Bay	60,000	?
Multinational Water & Power (Clancey)	1990	Fraser River in British Columbia (to California)	40	4

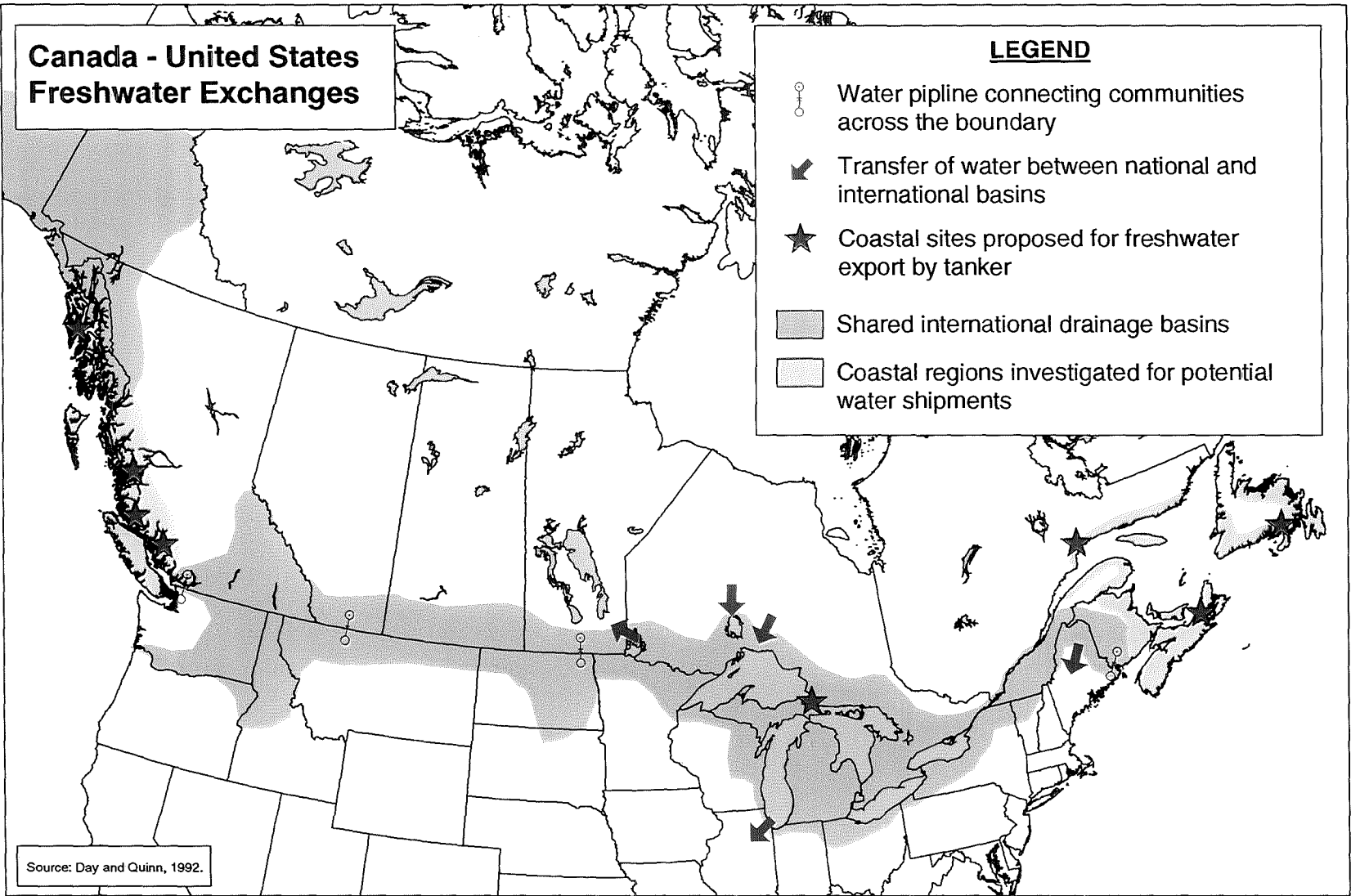


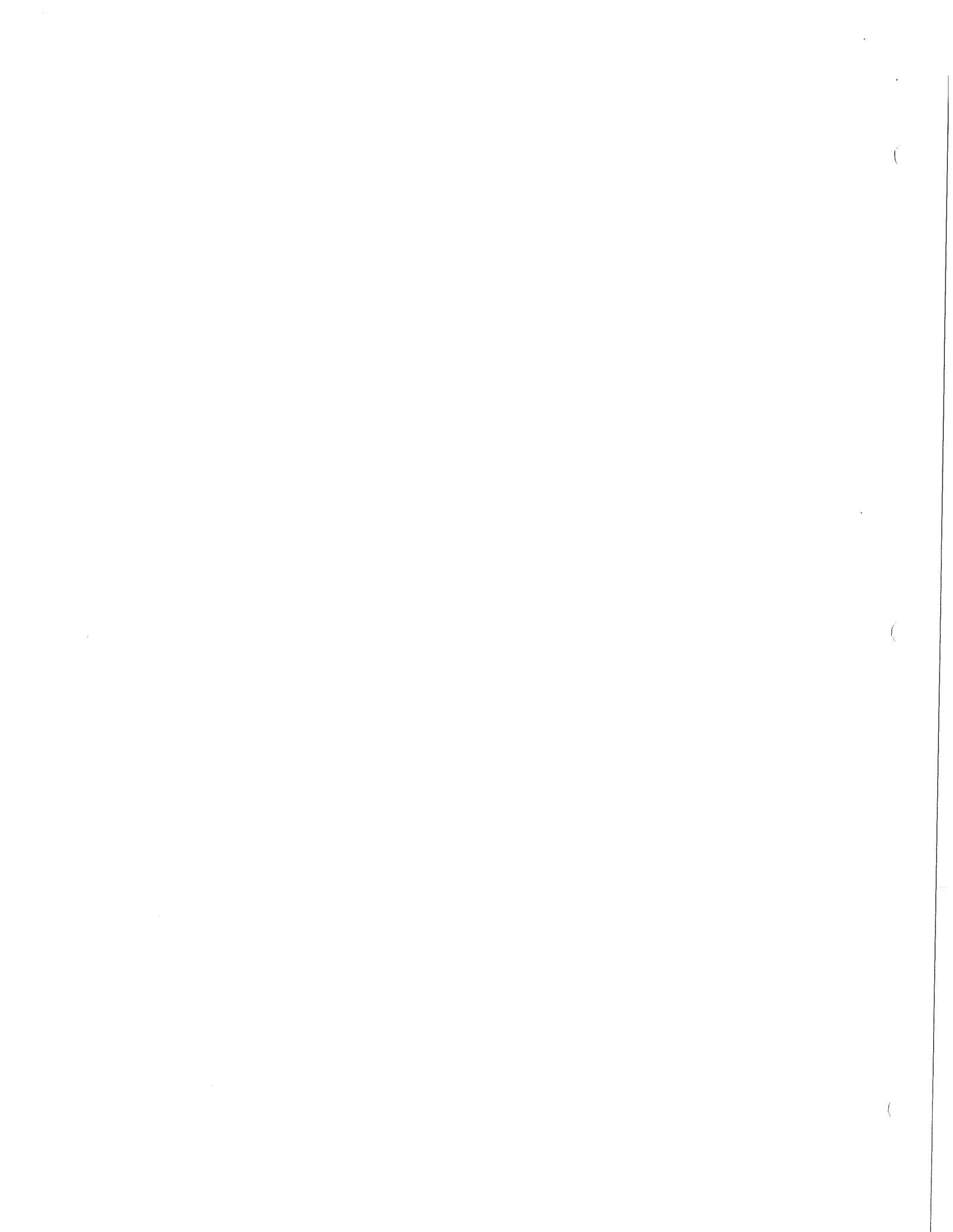
Canada - United States Freshwater Exchanges

LEGEND

- Water pipeline connecting communities across the boundary
- Transfer of water between national and international basins
- ★ Coastal sites proposed for freshwater export by tanker
- Shared international drainage basins
- Coastal regions investigated for potential water shipments

Source: Day and Quinn, 1992.

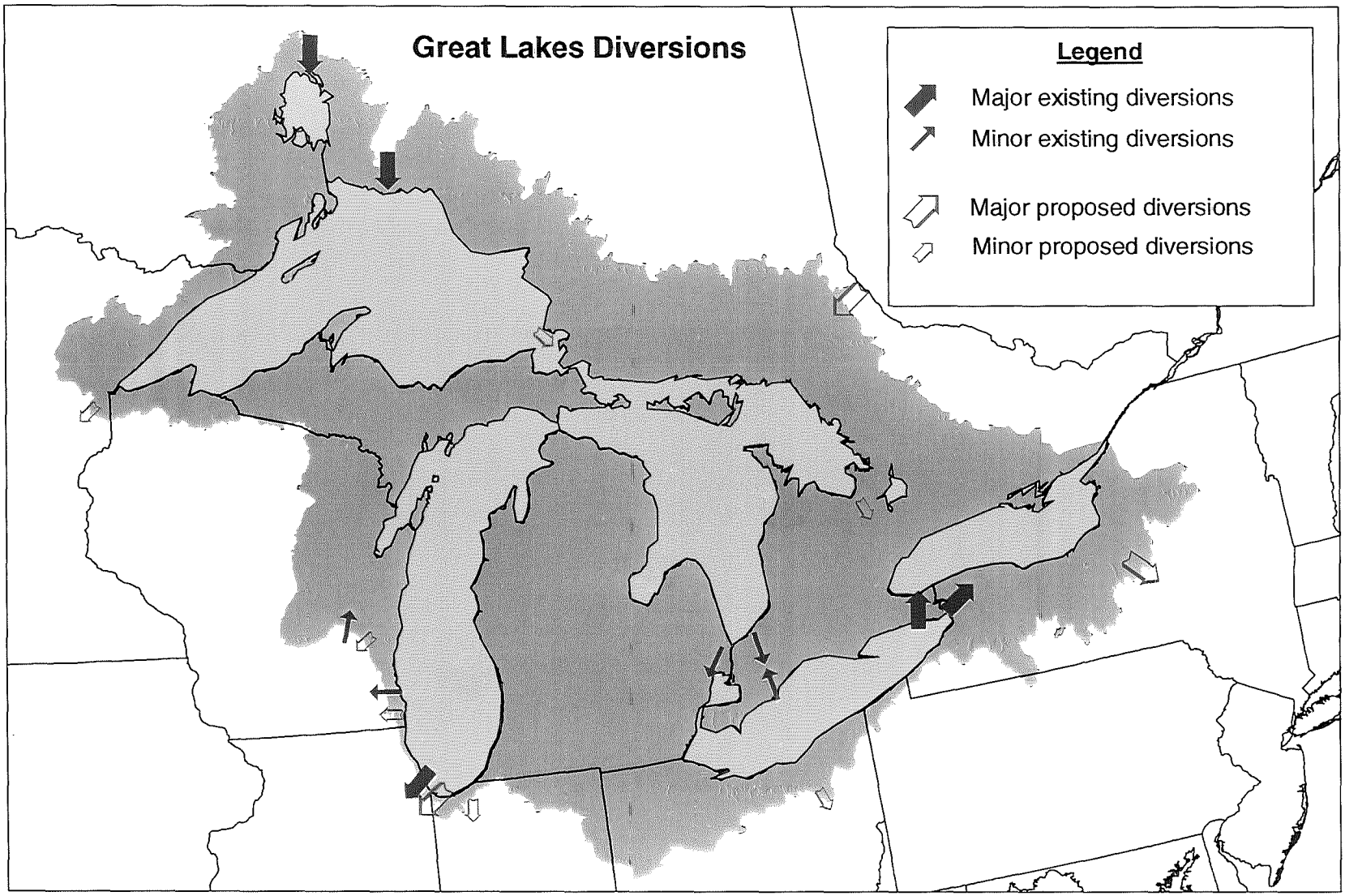


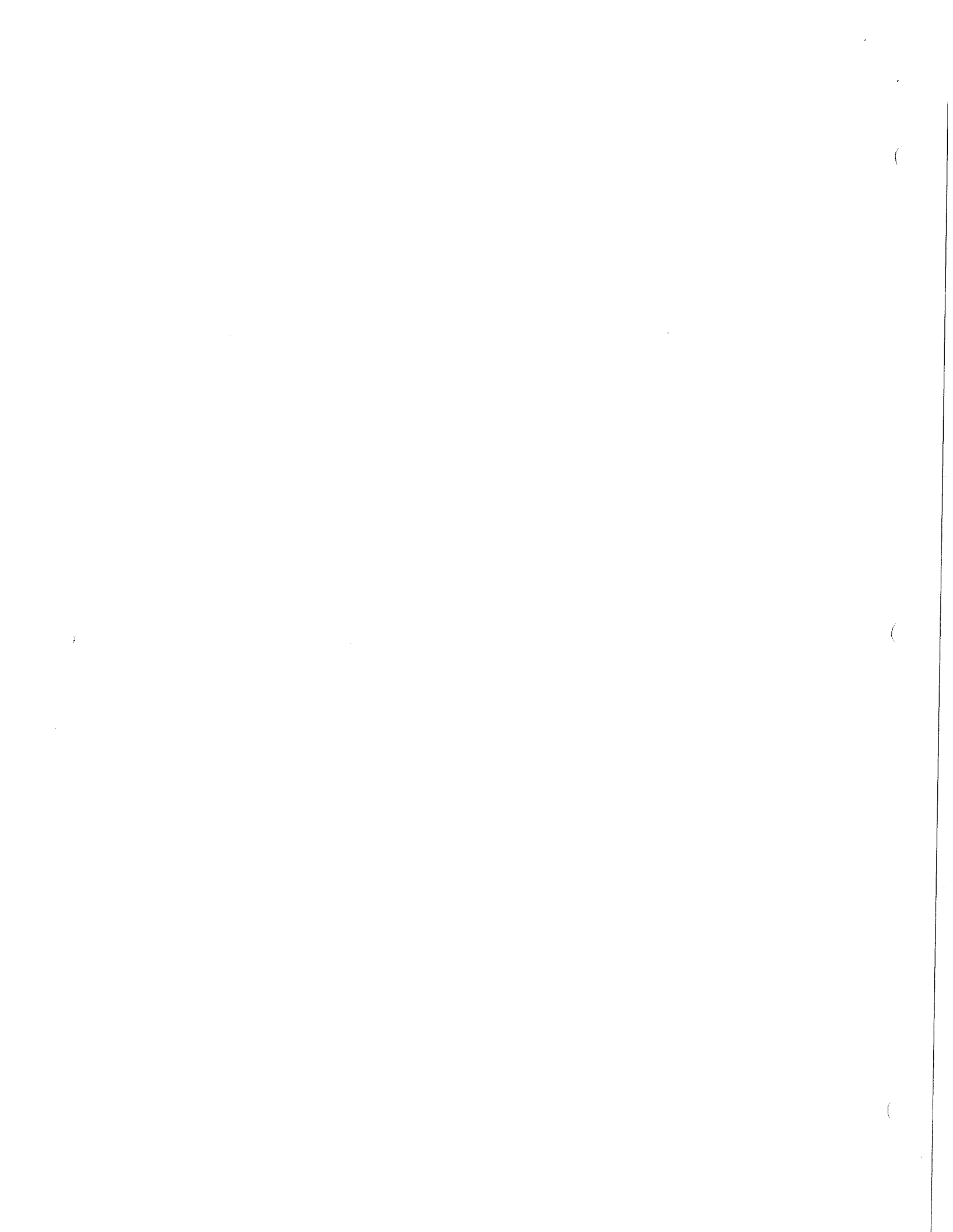


Great Lakes Diversions

Legend

- Major existing diversions
- Minor existing diversions
- Major proposed diversions
- Minor proposed diversions





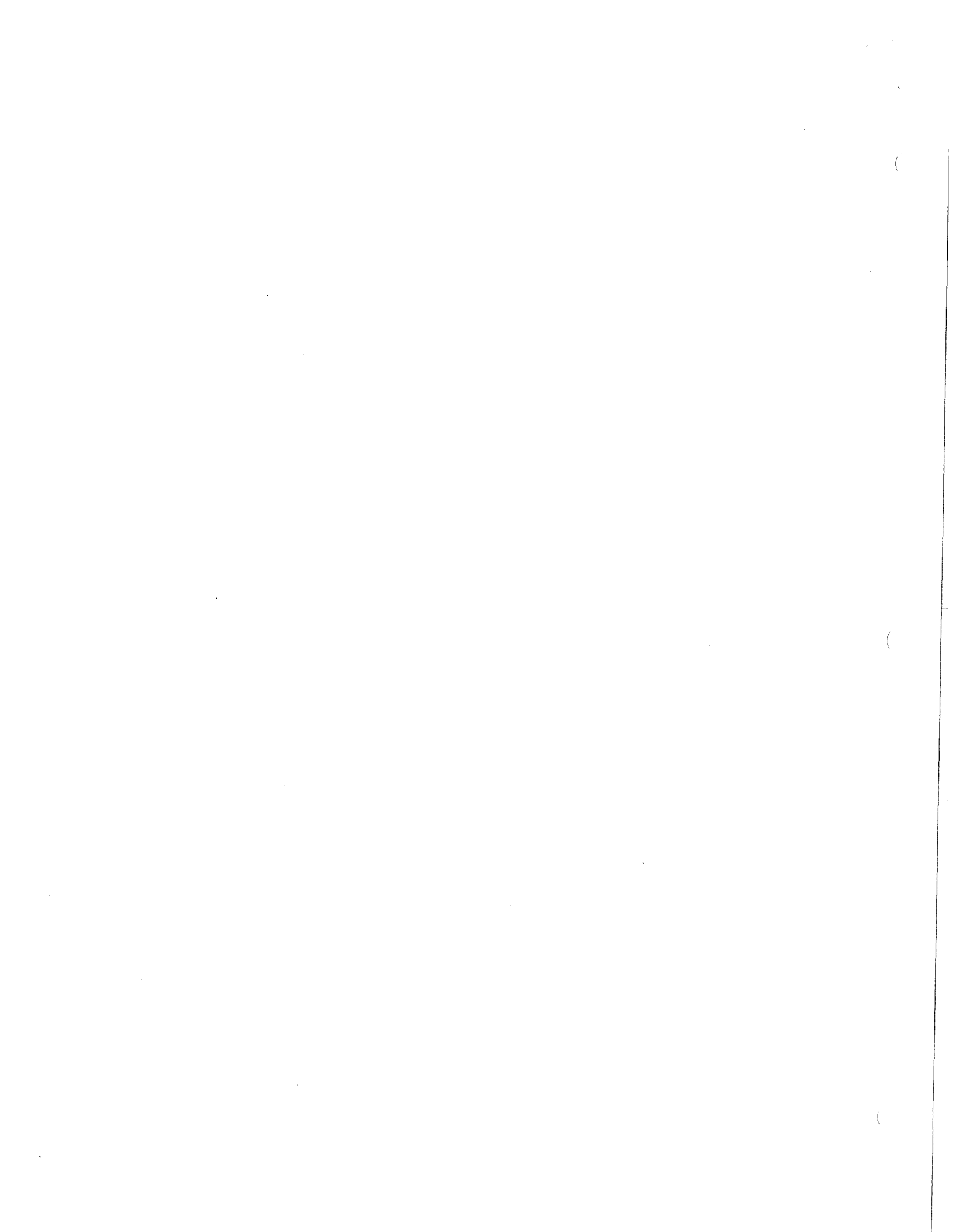
GREAT LAKES DIVERSIONS

EXISTING

	DATE OPERATIONAL	RATE OF FLOW IN M ³ / 5
1. INTERBASIN		
Ogoki (into L. Superior)	1943	113
Long Lake " "	1939	45
Chicago (out of L. Michigan)	(1848)1900	90
Pleasant Prairie " "	1990	0.1
2. INTRABASIN		
Welland Canal	(1829)1932	260
NY State Barge Canal	(1825)1918	20
Detroit	1975	4
London	1967	3
Portage Canal	1860	2

PROPOSED OR CONSIDERED

1. INTERBASIN		
Grand Canal	1959	2250
Chicago Expanded	1988	270
New York City		
Powder River (Wyo) Coal Slurry	1981	0.5
Lowell	1989	< 0.1
Crandon Mine	1996	< 0.1
Nova Group	1998	< 0.1
<i>Mud Creep</i>		
2. INTRABASIN		
Georgian Bay - York Region	1996	Up to 1
<i>Alliston</i>		



**Proposals for Bulk Removal of Water
by Marine Tanker**

1. **British Columbia** **1985-91**

6 LICENSES

SNOWCAP/SUNBELT → SANTA BARBARA, GOLETA

MORATORIUM 1991, LEGISLATION 1995

2. **Newfoundland** **1996**

GISBORNE LAKE

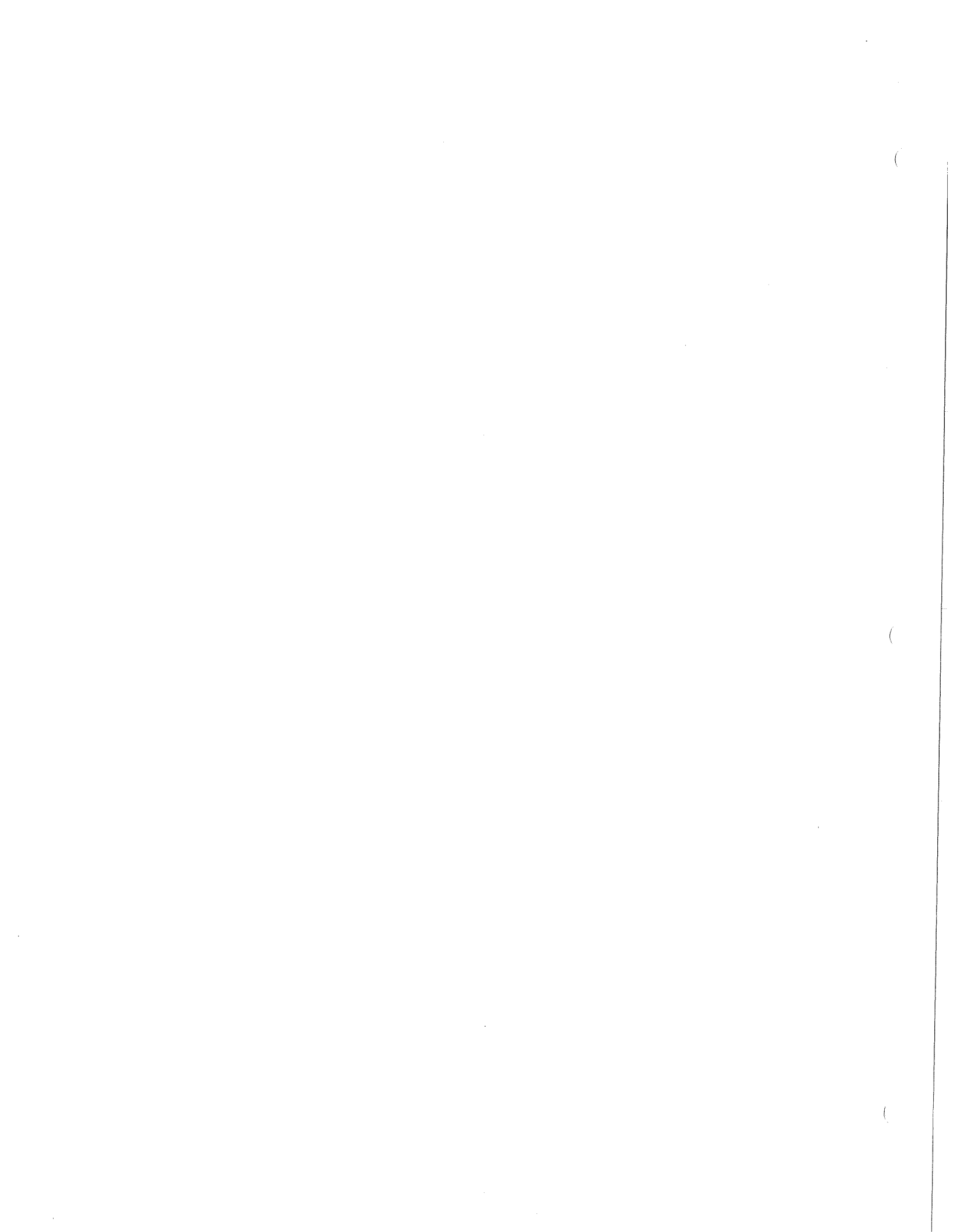
3. **Ontario** **1998**

NOVA GROUP

4. **Québec and the "Canada - Wide Accord"**

5. **Alaska**

6. **Others?**



WATER EXPORT CONTROVERSY, 1960_s - 1990_s

WHAT'S NEW??

- **CLIMATE CHANGE**
- **BIO INVASIONS**
- **SUPERTANKERS**
- **FRESH/SALT WATER RELATIONSHIP**
- **ABORIGINAL RESISTANCE**
- **RECYCLING AND REALLOCATION AMONG USERS**
- **CUMULATIVE EFFECTS**
- **ENDANGERED SPECIES PROTECTION**

