



*Northern Voices,
Northern Waters*

**TOWARDS A WATER RESOURCES
MANAGEMENT STRATEGY FOR THE
NORTHWEST TERRITORIES**

A DISCUSSION PAPER ON
STRATEGY DEVELOPMENT

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EXECUTIVE SUMMARY - TOWARDS A WATER RESOURCES MANAGEMENT STRATEGY FOR THE NORTHWEST TERRITORIES

Introduction

Clean and abundant water resources have always been a basic expectation of Northwest Territories (NWT) residents. *Northern Voices, Northern Waters - Towards a Water Resources Management Strategy for the Northwest Territories* is a discussion paper that sets out a proposed approach to developing a future NWT Water Resources Management Strategy. This approach is based on the many issues that impact the managing of our watersheds, at the local, regional, national and global levels, and will help ensure that our water remains healthy today and into the future.

The Government of the Northwest Territories (GNWT), as represented by the Department of Environment and Natural Resources (ENR), along with Indian and Northern Affairs Canada (INAC) recognize that the sound management of northern water resources is a top priority. Various NWT land claims agreements also set out the specific rights and responsibilities of Aboriginal governments with respect to water resources management. Pressures on water from within the NWT and from neighbouring jurisdictions continue to increase. Residents of the NWT must collectively play a greater role in understanding the significance of current and emerging water management issues and in influencing and shaping the future direction of water resources management.

The Current Context for Water Management

Globally, the United Nations Environment Program (UNEP) has produced the *Water Policy and Strategy* (2007) that sets out an overall goal for UNEP water resources management:

“To contribute to environmental sustainability in the management of water resources, utilizing integrated ecosystem approaches as a contribution to the internationally agreed targets and goals relevant to water and socio-economic development”.

Nationally, watershed management has been identified as a high priority. The federal government has prepared a number of comprehensive reports examining the threats to water quantity, quality and aquatic ecosystems in Canada. The Speech from the Throne (2007) and Federal Budget (2007) identified that Canada would be developing a new and comprehensive national water resources management strategy to replace the Federal Water Policy (1987).

Regionally and of direct interest to the NWT, the need for effective integrated watershed management has given rise to the Mackenzie River Basin Board (MRBB) and the Mackenzie River Basin Transboundary Master Agreement that guides the operation of the MRBB. The Master Agreement commits the parties, of which the GNWT and Canada are signatories, to the following principles in carrying out their responsibilities in the basin:

1. Manage the water resources in a manner consistent with the maintenance of the ecological integrity of the aquatic ecosystem.
2. Manage the use of the water resources in a sustainable manner for present and future generations.
3. Allow each Party to the Agreement to use or manage the use of water resources within its jurisdiction provided such use does not unreasonably harm the ecological integrity of the aquatic ecosystem in any other jurisdiction.
4. Provide for early and effective consultation, notification and sharing of information on developments and activities that might affect the ecological integrity of the aquatic ecosystem in another jurisdiction.
5. Resolve issues in a cooperative and harmonious manner.

The current water resources management context has directly influenced the proposed approach to the development of an NWT Water Resources Management Strategy and the related actions outlined for discussion amongst NWT water partners. It also provides the basis to inform the development of a future pan-territorial water resources management strategy.

An Approach to Strategy Development

Northerners have already provided much advice and comment on the importance of sound management of our water resources. Aboriginal leaders and other Northerners have spoken clearly and emphatically about their concerns and expectations on many occasions, most recently at the Water Wise Conference (2007) and the Keepers of the Water Gatherings (2006, 2007). This input, in combination with global, national, regional and local influences, has resulted in the proposed approach intended to guide the development of an NWT Water Resources Management Strategy.

This document, *Towards a Water Resources Management Strategy for the Northwest Territories*, has been developed by a Water Strategy Working Group consisting of representatives from the GNWT's Department of Environment and Natural Resources (ENR) and INAC's regional NWT office. The working

group has been assisted by Terriplan Consultants. *Towards a Water Resources Management Strategy for the Northwest Territories* is not a strategy itself but a discussion paper that describes a proposed approach to strategy development. This approach will be subject to discussions with all NWT water partners, including Aboriginal governments, regional organizations, communities, environmental non-governmental organizations, businesses, territorial and federal governments and interested residents.

Seeking an NWT consensus on what water resources management in the NWT should look like is essential if we are to collectively manage our water resources effectively today and for future generations. Broad discussions and engagement are needed to determine the form of a strategy and the types of actions required for effective implementation. The proposed approach is presented in the form of an annotated table of contents. This outline is descriptive, providing a sense of what could be included in a final NWT Water Resources Management Strategy. Some components that may be considered for inclusion have been listed.

- 1.0 The Purpose of an NWT Water Resources Management Strategy
- 2.0 The Evolution of an NWT Water Resources Management Strategy
- 3.0 A Northern Voice for Guiding Water Management
- 4.0 Fundamental Principles
- 5.0 The Dimensions of Northern Water Management - Assessing Water Needs
- 6.0 Water Management Decision-Making - Supporting Processes
- 7.0 Monitoring and Sustainability Accounting
- 8.0 Current and Emerging Issues
- 9.0 Engagement in developing an Water Resources Management Strategy
- 10.0 Moving Forward

Each component is briefly described below:

Section 1.0: The Purpose of an NWT Water Resources Management Strategy - should present the need for an NWT Water Resources Management Strategy and discuss the NWT water partnerships required to effectively develop and implement a strategy.

Section 2.0: The Evolution of an NWT Water Resources Management Strategy - should describe how NWT water resources are currently managed, the guiding policies, plans and programs that govern current water resources management, some of the current water resources management issues and the future relationship of water resources management to broader NWT environmental management initiatives.

Section 3.0: A Northern Voice for Guiding Water Management - should present a preliminary Northern Voice for an NWT Water Resources Management Strategy. It should reflect advice provided at the NWT Water Wise Conference (2007), and shape a future strategy. This preliminary Northern Voice is to be reviewed, expanded and confirmed through engagement with a full range of NWT water partners.

Section 4.0: Fundamental Principles - should set out principles to guide the development and implementation of an NWT Water Resources Management Strategy. During Water Wise Conferences, Keepers of the Water Gatherings and other forums, participants have articulated a number of principles which could potentially guide the development and implementation of an NWT Water Resources Management Strategy. Fourteen preliminary principles have been identified for discussion.

Section 5.0: The Dimensions of Northern Water Management - Assessing Water Needs - a strategy should address a set of primary needs. This section could describe the four primary needs of significant importance to the NWT: Human, Ecosystem, Traditional Cultural and Economic.

Section 6.0: Water Management Decision-Making - Supporting Processes - this section should describe approaches to water resource management decision-making. It can set out the need for

guidance and identifies how alternative courses of actions will be considered, along with the tools and methods required to guide decision-making. This section could also describe the approach to developing the organizational relationships for the implementation of an NWT Water Resources Management Strategy and defining the various roles and responsibilities of NWT water partners.

Section 7.0: Monitoring and Sustainability Accounting - this section should provide proposals for the development of a framework for monitoring and assessing the effectiveness of a strategy including tracking 'charges' on the NWT's natural water account. The results of monitoring and accounting may provide the NWT with guidance and feedback on the sustainability of its water resources management decisions. This section can also describe processes that could be used to stay abreast of, and make use of, research results on water and water resources management.

Section 8.0: Current and Emerging Issues - the NWT is currently facing a number of serious issues related to water resources management. In the future, new water resources management issues will likely emerge. This section should outline an approach to examine emerging issues and determine how the NWT might address these issues within an NWT Water Resources Management Strategy.

Section 9.0: Engagement in Developing an NWT Water Resources Management Strategy - *Towards a Water Resources Management Strategy for the Northwest Territories* has been developed by a Water Strategy Working Group made up of representatives from the GNWT's Department of Environment and Natural Resources and INAC. However, there are many NWT organizations that share responsibility for water management. They include: Aboriginal, territorial and federal governments, regional organizations, communities, environmental non-governmental organizations, boards and agencies, businesses and interested residents. All must be engaged on all aspects of a strategy, from its development to its implementation. This section should set out key considerations for a possible program intended to engage a wide-range of NWT water partners in water resources management discussions.



SECTION 1.0

THE PURPOSE OF AN NWT WATER RESOURCES MANAGEMENT STRATEGY

1.0 THE PURPOSE OF AN NWT WATER RESOURCES MANAGEMENT STRATEGY

Water is a critical component of the economic and social well-being of the NWT. The value of water to all NWT residents encompasses human, environmental, economic, traditional and cultural needs. The governments of the Northwest Territories --- federal, territorial, and Aboriginal --- play roles as legitimate and responsible managers of NWT water resources and can help ensure that this value of water is maintained.

Management of NWT water resources is a priority of the Government of the Northwest Territories (GNWT) and the Government of Canada, as represented respectively by the Department of Environment and Natural Resources (ENR) and Indian and Northern Affairs Canada (INAC). The quantity and quality of water resources within the territory are of growing concern due to increasing pressures both within the NWT and in neighbouring jurisdictions. Residents of the NWT have repeatedly declared the significance of water in various water-related forums and in reference to specific development activities within the borders of the NWT and beyond. Residents of the NWT must collectively play a greater role in understanding the significance of current and emerging water management issues and in influencing and shaping the future direction of water resources management.

At present, the GNWT's direct legislative mandate on water issues is limited to (among other things) drinking water quality and environmental protection. Even within this somewhat limited water resources management scope, an NWT Water Resources Management Strategy is essential. The proposed strategy is based on the concept of integrated watershed management and the need to manage water resources in a comprehensive and systematic manner. In this context, the GNWT has an undeniable role as a legitimate and responsible manager of NWT water resources.

INAC has certain responsibilities related to the management of NWT waters that include developing and managing research and scientific programs on water related issues, developing guidelines and codes of practice for water resources management and monitoring, and providing ongoing expert and scientific

procedural advice.

Various NWT land claims agreements also set out the specific rights and responsibilities of Aboriginal governments and resource management boards with respect to water management.

The development of an NWT Water Resources Management Strategy will further define the roles of the NWT parties and the actions required to properly manage territorial water resources.

1.1 RATIONALE OF AN NWT WATER RESOURCES MANAGEMENT STRATEGY

1.1.1 Global Context

Globally, water resources management is a high priority of the United Nations. The following is an excerpt from the **United Nations Millennium Declaration (Resolution 55/2, 2000)**.

“To stop the unsustainable exploitation of water resources by developing water resources management strategies at regional, national and local levels, which promote both equitable access and adequate supplies.”

The United Nations Environment Program (UNEP) has acted on this direction to produce the **Water Policy and Strategy of UNEP (2007)**, a document which can inform the development process of an NWT Water Resources Management Strategy. More specifically, the overall goal for the UNEP water policy and strategy is:

- *To contribute substantively to environmental sustainability in the management of water resources, utilizing integrated ecosystems approaches, as a contribution to the internationally agreed targets and goals relevant to water and socio-economic development.*

Three key components of the strategy, which are tied together within a framework of integrated water resources management, include:

- **Assessment** (i.e., improved assessment and awareness of water issues),
- **Management** (i.e., improved environmental management of basins, coastal and marine waters),
- **Cooperation** (i.e., improved cooperation in the water sector).

The UNEP strategy is elaborated through a set of principles designed to focus water resources management by outlining:

- *Conceptual considerations*, and
- *Operational means*.

The three conceptual principles are as follow:

(1) Promote ecosystem-based approaches

Ecosystem-based approaches factor in the full range of **terrestrial and aquatic ecosystems**, looking at a **hydrological basin as a whole** in both its upstream and downstream dimensions, including, among other things, specific ecosystems such as forests, land, wetlands, urban ecosystems and coastal zones.

(2) Contribute to sound economic and social development through integrated assessment and management of water resources and associated ecosystems

Water is a vital resource for human life and health, ecosystems management, and for economic development and must be managed as such. Maintaining the health of ecosystem services is of particular importance, as is preventing degradation caused by unsustainable natural resource management practices. A shift is needed away from **supply-side policies to integrated supply and demand management approaches** which incorporate the **value of the multiple uses** of water while protecting ecosystem services. Consequently, UNEP will promote the **greater use of economic and social instruments** and technological improvements to promote the efficient and equitable use of water.

(3) Address risks

Extreme hydrological events such as floods and droughts, other natural and man-made hazards and accidental pollution of water bodies pose **major risks** to growth and sustainable development. Additionally, **climate change and variability** may exacerbate extreme events or require long-term planning for effects such as sea-level rise. These events should be addressed in the context of an **integrated approach to water resources management** geared towards developing prevention and preparedness measures, together with risk mitigation and disaster reduction strategies, and towards strengthening the prevention and control of pollution resulting from wastewater.

The three operational principles are as follows:

- (1) Build national and regional capacity;**
- (2) Build on existing programs and partnerships and form new partnerships; and**
- (3) Promote multi-water partner participation.**

1.1.2 National Context

Nationally, watershed management is a high priority. The federal government's *Federal Water Policy (1987)*, was designed to encourage the use of fresh water in an efficient and equitable manner consistent with the social, economic and environmental needs of present and future generations. Canada's *Federal Water Policy* has two main goals:

1. To protect and enhance the quality of the water resources in Canada via mechanisms such as increased regulation and the adoption of the "polluter pays" principle.
2. To promote the wise and efficient management and use of water by developing pricing and valuation schemes.

In order to fulfil these goals, the federal government has initiated the following:

1. Water Pricing

The federal government is committed to the concept of "a fair value for water." To implement this, the federal government:

- a. Endorses the concept of realistic pricing as a direct means of controlling demand and generating revenues;
- b. Develops new technologies and industrial processes that minimize costs, and encourage water conservation;
- c. Undertakes, supports and promotes joint federal-provincial examination of the costs and pricing of water; and
- d. Encourages the application of pricing and other strategies, such as the beneficiary/polluter pays concept.

2. Science Leadership

Water-based economic development that is environmentally compatible with official policies requires cooperation in developing new and improved technology. The federal government recognizes it must play a national leadership role in the promotion of these efforts. To that end, the federal government will:

- a. Conduct and encourage the undertaking of physical, chemical, biological and socio-economic investigations;
- b. Establish research advisory mechanisms with representation from scientific and applied research communities to advise on program needs and priorities;
- c. Develop and maintain, with the provinces and territories, water data and information systems directed to improving the knowledge available for managing Canada's water resources;
- d. Promote cooperative federal-provincial endeavours;
- e. Support research and technological development;
- f. Encourage opportunities for non-governmental technological development and a private sector water conservation industry; and

- g. Foster international cooperation in scientific and technological research and development and in data and information collection systems.

3. Integrated Planning

The federal government endorses an approach to the planning and development of water resources which ensures that demands placed upon improving the quality and quantity of water resources are met efficiently and equitably, and in a manner that ensures that the many values of water and related resources are recognized. Supporting this commitment to integrated, long-term planning for the development and management of water and related resources, the federal government will:

- a. Adhere to integrated water resource planning in areas of federal jurisdiction, and in inter-jurisdictional waters subject to federal-provincial-territorial agreements;
- b. Encourage the integration of water resources management plans and objectives with those of other natural resources;
- c. Establish and apply evaluation criteria to all federally sponsored projects to ensure their compatibility with federal goals respecting water resources management;
- d. Ensure that all significant national and international water-related development projects, are subject to the Federal Environmental Assessment and Review Process, so that potential adverse environmental and socio-economic effects can be identified and mitigated;
- e. Ensure the participation or cooperation of all relevant coordinating and regulatory agencies; and
- f. Encourage and support opportunities for public consultation and participation in the integrated planning process.

4. Legislation

There is a clear need to modernize the legislative base to protect the health and safety of Canadians and the many values of water and related resources which Canadians now hold. The federal government will renew, consolidate or otherwise strengthen the application of existing federal legislation in order to:

- a. Produce legislative provisions to address inter-jurisdictional water issues;
- b. Control and manage toxic chemicals throughout their entire life cycle;
- c. Establish water quality standards and guidelines to better protect human health and the diversity of species and ecosystems;
- d. Encourage the development of bodies which address potential provincial-territorial and inter-provincial water conflicts; and
- e. Ensure the effectiveness of regulatory measures through the provision of appropriate enforcement and compliance measures.

According to Environment Canada, “many of the issues and strategies outlined in the 1987 policy remain valid today”¹ despite the date of publication. In the Speech from the Throne (2007) and the Federal Budget (2007), the Government of Canada announced it was committed to developing a new national water strategy, including a number of transboundary-related policy commitments (e.g. \$5 million to carry out a study with the U.S. on the flow of water out of Lake Superior, and accelerating the clean up of the Great Lakes basin).²

The federal government has also prepared a number of comprehensive reports examining the threats to water quantity and quality and aquatic ecosystems in Canada. In a 2004 report entitled *Threats to Water Availability in Canada*, Environment Canada’s National Water Research Institute identified a number of potential threats to both the quality and quantity of water within Canada.

Key recommendations from the 2004 report to address integrated and cumulative threats to water availability are that government and non-government water partners should take the following steps:

¹ Environment Canada “Freshwater Website: Federal Water Policy” http://www.ec.gc.ca/water/en/info/pubs/fedpol/e_fedpol.htm

² Finance Canada. “Budget Plan 2007 - Chapter 3: A better Canada” <http://www.budget.gc.ca/2007/bp/bpc3e.html>

1. Assess integrated and cumulative threats and create appropriate linkages to water planning and management
2. Make **dialogue** a tool of management
3. Utilize a **broader range of policy instruments**
4. Give consideration to **equity and sustainability** in decision making
5. Increase the **capacity of institutions** to respond
6. Increase the **investment in databases and improve access to data**
7. **Broaden research efforts**

1.1.3 Regional Context

Regionally and of particular relevance to the NWT, the need for effective integrated water resources management has given rise to the Mackenzie River Basin Board (MRBB)³ and the Mackenzie River Basin Transboundary Master Agreement that guides the operation of the MRBB. The Master Agreement provides the specific overarching framework within which water resources management is to occur. The guiding principles on which the Master Agreement is based have contributed to, and have helped form, the foundation for the principles that guide the development and implementation of an NWT Water Resource Management Strategy.

The waters of the Mackenzie River Basin are a precious resource and they present unique challenges to water resource managers. A multi-jurisdictional agreement enables the Mackenzie River Basin Board to implement a set of principles and accomplish a vision for water resources management in the basin, goals for water resources management in the basin, steps to achieve these goals and the key issues that will direct the Board's activities and business plans for the next five years.

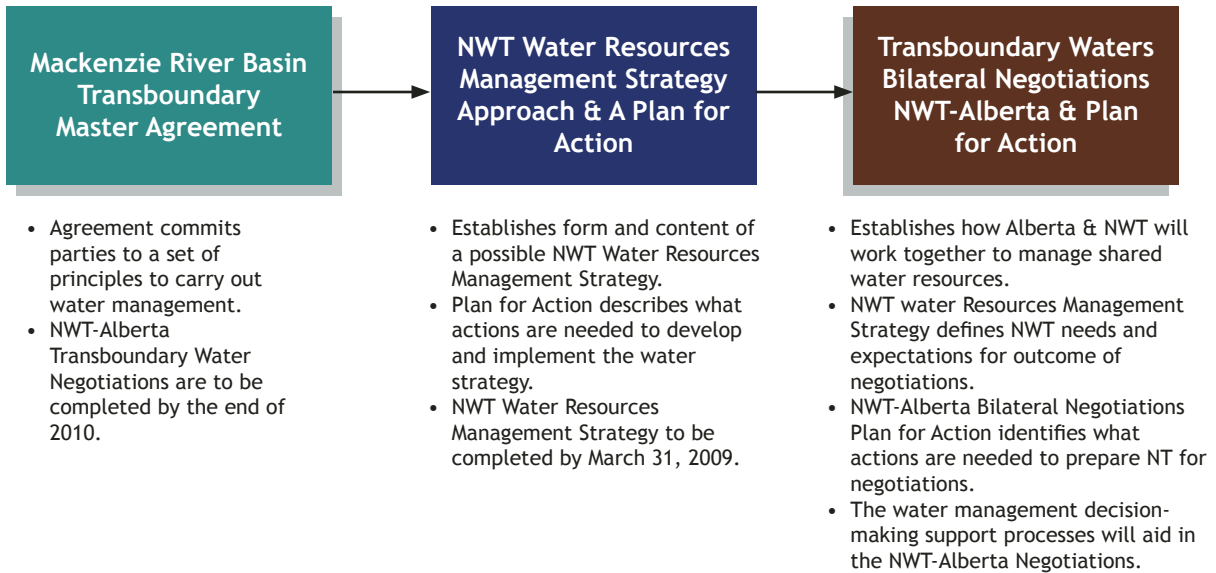
More specifically, the Master Agreement commits all signatories to the following principles in carrying out their responsibilities in the basin:

- (1) Manage the water resources in a manner consistent with the maintenance of the ecological integrity of the aquatic ecosystem.
- (2) Manage the use of the water resources in a sustainable manner for present and future generations.
- (3) Allow each Party to the Agreement to use or manage the use of water resources within its jurisdiction provided such use does not unreasonably harm the ecological integrity of the aquatic ecosystem in any other jurisdiction.
- (4) Provide for early and effective consultation, notification and sharing of information on developments and activities that might affect the ecological integrity of the aquatic ecosystem in another jurisdiction.
- (5) Resolve issues in a cooperative and harmonious manner.

This is the context within which this *Towards a Water Resource Management Strategy for the Northwest Territories* discussion paper has been developed, and this will be one of the underpinnings which will inform engagement and discussion with NWT Aboriginal leaders and other water partners.

³ Members of the Mackenzie River Basin Board include the NWT, Yukon, British Columbia, Alberta and Saskatchewan.

**Figure #1: Towards A NWT Water Resources Management Strategy
Key Relationships
NWT Water Resources Management Strategy & NWT/AB Bilateral Negotiations**





SECTION 2.0

THE EVOLUTION OF AN NWT WATER RESOURCES MANAGEMENT STRATEGY

2.0 THE EVOLUTION OF AN NWT WATER RESOURCES MANAGEMENT STRATEGY

This section should set out the roles of the current water managers, the GNWT, as represented by ENR, along with INAC. The evolution of an approach to strategy development to the current draft state is based on a number of foundational documents and statements. This section should synthesize initiatives and actions by drawing upon a range of foundational documents, including:

- Legislative Assembly's strategic direction, including Motion 20-15(5): *Right To Water* in 2007;
- ENR Business Plan;
- ENR Framework for Action 2005-2008;
- Mackenzie River Basin Transboundary Master Agreement;
- Framework for Action Status Report - November 2007;
- Business Plan for the GNWT;
- INAC Water Resources Business Plan;
- GNWT Water Wise Report - December 2007; and
- Motions by the Territorial Legislative Assembly.

This section can also introduce and discuss the water issues of concern to the NWT. The following are some of the key water management issues that an NWT Water Resources Management Strategy should address:

- real or perceived changes in stream flow, groundwater and lake levels;
- contaminant transport in northern rivers from upstream industrial development;
- changes in water quantity, quality and ecosystem structure as a result of climate change;
- links between chemical and physical changes (i.e., water quality and quantity) and ecological and biological effects;
- the potential significance of these changes on subsistence harvesting and cultural practices;

- the need for focused monitoring to ensure that values of interest are addressed, especially in the context of climate change;
- the need for “early-warning” monitoring programs to document and quantify changes in the resource;
- the need for coordinated research and reporting on water science issues, and results of studies and water monitoring programs to NWT residents and other jurisdictions;
- the need for research in significant northern areas to understand historical changes and current conditions to allow future predictions;
- the need for effective communications and consultation on water resources management issues with NWT residents;
- the need for effective information exchange with other jurisdictions on the concerns of NWT residents from upstream developments; and
- the need to effectively implement myriad of water legislation that often is not coordinated or interconnected among governments, departments and agencies.

2.1 LINKAGES TO NWT ENVIRONMENTAL MANAGEMENT AND LAND USE PLANNING & MANAGEMENT

This section should specifically link an NWT Water Resources Management Strategy to the various resource management, environmental planning, and environmental management initiatives across the NWT; and describe how such a water strategy supports the broader NWT Environmental Stewardship Framework, as presented at the Water Wise Conference in November 2007.

Linkages could also be made with the NWT Lands Framework Initiative of the 16th Territorial Legislative Assembly. This section could describe how an NWT Water Resources Management Strategy and an NWT Lands Framework are to be integrated.

2.1.1 *Work Plan Actions*

A detailed draft Plan for Action might identify three specific actions that could be undertaken to develop this section of an NWT Water Resources Management Strategy. Specifically, the following action items could contribute to the development of this section:

- *Conduct Scan and Review all relevant NWT Related Documents*
- *Develop Rationale for an NWT Water Resources Management Strategy*
- *Describe the Relationship between the Water Resources Management Strategy, NWT Land Use Framework and broader NWT Environmental Management Initiatives*



SECTION 3.0

A NORTHERN VOICE FOR GUIDING WATER RESOURCES MANAGEMENT

3.0 A NORTHERN VOICE FOR GUIDING WATER RESOURCES MANAGEMENT

Developing an NWT Water Resources Management Strategy will require a Northern Voice to guide its development and implementation. Based on comments provided by the Water Strategy Working Group at several working sessions which brought together regulatory boards and communities, a possible and preliminary Northern Voice for an NWT Water Resources Management Strategy could give expression to this work and to the strategic vision of the Legislative Assembly through Motion 20-15(5): Right To Water as follows:

- Water is integral to the ecological, social, cultural and economic fabric and health of the Northwest Territories (NWT). Water is a renewable resource that if managed wisely will sustain the people and ecosystems of the NWT far into the future. Water management involves guiding water and land uses so that the residents of the NWT will enjoy the greatest net benefits over the short and long term. Effective water resources management demands a collective commitment of the residents of the NWT and neighbouring provinces and territories to using water in a manner that respects the rights and interests of other water users. Such a commitment will contribute to sustainable management of the NWT's water resources.

Towards a Water Resources Management Strategy for the Northwest Territories provides a preliminary framework for developing a water resources management system so that future water resources management decisions ensure that this vision is best fulfilled. A final Northern Voice to guide the strategy development should be derived from a comprehensive discussion and engagement process that focuses on NWT interests.



FUNDAMENTAL PRINCIPLES

SECTION 4.0

4.0 FUNDAMENTAL PRINCIPLES

An NWT Water Resources Management Strategy should be governed by a set of principles. Based on comments provided by the Water Strategy Working Group, the outcome of the Water Wise Conference (2007), and with regard for the evolving water resources management strategies and approaches noted in Section 1.1, a preliminary set of fourteen fundamental principles has been identified on which an NWT Water Resources Management Strategy may be founded:

1. Watersheds - The Essential Unit
2. Surface and Groundwater Connections
3. Sustainability
4. Renewability
5. Multiple Uses/Values
6. Joint Production of Benefits
7. Values and Valuation
8. Treaty and Aboriginal Rights, Land Claims, Water Rights and Ownership
9. Maximization of Social Well-being
10. Fairness and Equity
11. Integrated Management
12. Natural Capital Accounting for Water
13. Risk and Uncertainty
14. Adaptive Management

These principles should be discussed with all water partners and, when finalized, guide the implementation of an NWT Water Resources Management Strategy. Like this entire document, these guiding principles are to be finalized only after engagement with a full range of NWT water partners.

4.1 PRINCIPLE #1: WATERSHEDS - THE ESSENTIAL UNIT

Watersheds are essential hydrological and ecological units, and include surface and groundwater flow systems. Watersheds are hierarchically organised with the smallest watershed areas combining to comprise elements of increasingly larger systems. Surface and groundwater flows are largely regulated by the configuration and nature of the watershed. The quantity and quality of surface and groundwater are strongly influenced by watershed characteristics. Changes in watersheds affect, both directly and indirectly, the quantity and quality of surface and groundwater. For these reasons, water resources management should be organized according to natural watershed units in an interconnected network of sub-watersheds/tributaries sequentially aggregated into larger watershed units.

4.2 PRINCIPLE #2: SURFACE AND GROUNDWATER CONNECTIONS

Surface and groundwater flow systems are inter-connected (i.e., surface water feeds groundwater systems, and flows in many surface water systems are supported in part by groundwater). Watershed management should address surface and groundwater issues as part of an interconnected and interdependent system.

4.3 PRINCIPLE #3: SUSTAINABILITY

Sustainability⁴ of water resources means:

- Ensuring that the fundamental elements of the water system, including the healthy functioning of aquatic ecosystems, are conserved;
- Using water resources to sustain current and future social well-being;
- More specifically, providing on a sustained basis sufficient quantity of water of appropriate quality to meet current and future needs including:
 - Human sustenance needs (i.e., drinking water);
 - Terrestrial and aquatic ecosystem needs;
 - Human cultural and traditional needs; and
 - Economic activity needs.

4.4 PRINCIPLE #4: RENEWABILITY

Renewability of water resources means:

- Recognizing that the hydrological cycle is continuous; and driven by climate and weather;
- Accepting that the flow of water follows basic physical laws (e.g., the law of gravity);
- Understanding that water itself is neither created nor destroyed, but changes in form and quality throughout the hydrological cycle due to natural and human influences; and
- Addressing the sequential use of water and the associated impacts of prior uses on subsequent uses.

4.5 PRINCIPLE #5: MULTIPLE USES/VALUES

Water supports multiple uses/values; some uses involve interruption or transformation of water flows and others do not. Active “consumption” involves removing water from the natural flow cycle (e.g., extraction for water supplies). Consumed water is returned after use often in a different form and/or

⁴ Conservation is not included as a specific principle. The essential elements of conservation are included through Principles #3, #4, #5, #6, #9 and #10. As well the fundamentals of conservation are reflected through all of the other principles as well. These principles have been designed to be as specific and unambiguous as possible so that clear and consistent interpretation will be ensured in the future.

quality. Some uses involve a specific location and transformation of the natural flow pattern (e.g., hydro electric power production). Other uses involve no direct consumption, transformation or a fixed location (e.g., transportation, recreation, aquatic ecosystem support). Some water values involve no physical consumption or transformation of any sort (e.g., traditional spiritual/cultural values). Watershed management decisions should address these multiple, diverse and sequential uses of water; many of which are provided at the same time by the same water body.

4.6 PRINCIPLE #6: JOINT PRODUCTION OF BENEFITS

The principle of joint production relates to the simultaneous production of water uses/values by a water body. Watershed management decisions relating to one use/value invariably affect other water uses/values associated with a water body. Consequently, altering a water system affects all water uses/values associated with that water system. The management of water uses/values cannot be separated and addressed independently, one at a time; instead, they should be addressed simultaneously and systematically.

4.7 PRINCIPLE #7: VALUES AND VALUATION

Watershed management involves making difficult trade-offs influencing many interests. These trade-offs require balancing multiple and often conflicting interests and multiple water uses/values. Watershed management decisions should respect and reflect these diverse interests. Doing so requires application of a systematic and transparent process for assessing and evaluating watershed management alternatives. A central element of this process is the estimation of the value assigned to different water uses/values by different interests. Formal valuation of water uses/values is a primary tool for guiding trade-off decisions, ensuring fairness and equity, and should reflect operating environment and input costs.

4.8 PRINCIPLE #8: TREATY AND ABORIGINAL RIGHTS, LAND CLAIMS, WATER RIGHTS AND OWNERSHIP

Cooperative management of water demands a clear and full recognition, understanding and respect for all water rights. Water rights and ownership, however, are complicated by the fundamental natural laws that govern the dynamics of water systems and immutable physical limits of water resources. Water rights play a pivotal role in resolving issues of fairness and equity and in sustaining a collective commitment to integrated watershed management. Land claims, self-government agreements and water rights are essential to recognize, respect and understand so that watershed management decisions fully address and reconcile these important considerations.

4.9 PRINCIPLE #9: MAXIMIZATION OF SOCIAL WELL-BEING⁵

The ultimate objective of watershed management is to increase the social well-being of all who are dependent on the water resources of the system. Social well-being includes all water uses/values that diverse interests derive from water resources. In general, the greater the overall collective well being is the better. This collective well-being includes not only immediate benefits enjoyed by the current generation, but also includes future benefits that will be enjoyed by future generations. In short, watershed management decisions should strive to maximise the social well-being enjoyed by current and future generations from the water resources, in full recognition of water as a fundamental human right.

⁵ This principle is technically referred to as “social welfare”. Given the potential for misinterpretation of the term “welfare”, “social well-being” is used instead throughout this document but the meaning is synonymous with the meaning of the technical term “social welfare”.

4.10 PRINCIPLE #10: FAIRNESS AND EQUITY

Watershed management, particularly when dealing with large watersheds, involves diverse interests, rights and expectations. As well, the distribution of benefits, disbenefits and costs of management are rarely evenly distributed throughout a watershed. The greatest challenge in watershed management is to arrive at a fair and equitable distribution of benefits, disbenefits and costs among diverse interests. Arriving at reasonable determinations of fairness must be guided by existing rights and obligations, principles of environmental justice and open and respectful dialogue among diverse affected interests.

Once a fair distribution is decided, effective means to redistribute benefits, disbenefits and costs must be applied. Over the short and long term, the success of this agreement will hinge not only on consistently and fairly redistributing benefits, disbenefits and costs but of equal importance will be this being seen as having been done by affected interests. Integrated watershed management depends ultimately on a collective commitment to work together. This commitment will only endure if all interests see the process as being fair and respecting their rights and perspectives.

4.11 PRINCIPLE #11: INTEGRATED WATERSHED MANAGEMENT

Water serves multiple purposes in multiple locations as it moves through a watershed system. Watershed management decisions at one location may affect downstream and upstream users - therefore the interests of all water users in a watershed are interrelated. For this reason, integrated watershed management is essential. Integrated watershed management requires individual local water resources management decisions to be evaluated and made as part of an overall set of coordinated watershed management decisions throughout a watershed. Given that integrated watershed management decisions are based on a systematic consideration of all water uses/values throughout a watershed, securing and sustaining grassroots understanding, participation and commitment in the management process is vital.

4.12 PRINCIPLE #12: NATURAL CAPITAL ACCOUNTING

Integrated watershed management should strive to ensure that the ecological goods and services supplied by a watershed are sustained such that the overall natural capital asset of the watershed is maintained and preferably increased over time. *Natural capital* are 'natural assets' given their role of providing natural resource inputs and ecological goods and services for economic production. A clear and consistent accounting of watershed natural capital is essential to ensure continual maintenance or even enhancement of this asset. Trends over time in watershed natural capital should be a primary performance measures for the success of integrated watershed management.

4.13 PRINCIPLE #13: RISK AND UNCERTAINTY - APPLYING THE PRECAUTIONARY PRINCIPLE

Management of any natural system including watersheds is inherently uncertain and risky. Management decisions invariably are based on imperfect information and understanding. Additionally, all systems involve stochastic elements⁶ (i.e. weather variability) that result in somewhat random variation over time. Integrated watershed management decisions should systematically address and account for risk and uncertainty. Forecasts and the evaluation of management alternatives must include consideration of uncertainty, and both the upside and downside risks associated with each alternative. Sensitivity analysis

⁶ Stochastic elements include weather variables (e.g., rainfall, temperature, wind direction and speed), ecological variables (e.g., recruitment, mortality) and even human systems (e.g., economic conditions). The precise values for these variables at any point in time are uncertain; on the other hand the actual values are known to range around mean values. The unpredictability of any of these values at any point in time means that conditions vary from one point in time to another and that management decisions must be prepared for this variation and responsive to change as it occurs.

should be used regularly to understand the implications of imperfect information and understanding and stochastic system elements. Watershed management decisions should explicitly employ the Precautionary Principle.⁷

4.14 PRINCIPLE #14: ADAPTIVE MANAGEMENT

Successful long-term integrated watershed management involves innovation, testing and continual improvement. Integrated watershed management should be guided by the rigorous “learn-by-doing” process on which adaptive management is based. This process involves evaluating management results and adjusting future management actions based upon what has been learned, effectively allowing policy to grow and adapt to uncertain situations. This will be increasingly important in the context of adapting to an evolving climate.

A detailed draft Plan for Action might identify the specific tasks that could be undertaken to carry out this part of the development of an NWT Water Resources Management Strategy. In particular, the following action item could involve the confirmation of these principles with NWT water partners.

- *Develop and Implement an NWT Engagement and Communication Program to Confirm Water Resources Management Strategy Voice and Principles*

⁷ The definition of the Precautionary Principle often varies greatly from one context to another with major implications for water resources management. The federal government has published “A Framework for the Application of Precaution in Science-based Decision-making about Risk” (Government of Canada, 2003). This document sets out 10 guiding principles for the application of precaution to science-based decision-making. The guide directs decision-makers to use the best available science and cautions that the absence of full scientific certainty shall not be used as a reason for postponing decisions where there is a risk of serious or irreversible harm. In other words, management decisions should not be deferred due to imperfect information (i.e., wait until better information is available). Instead, management decisions should be made as required from time to time and by making the best use of the best available information and by ensuring follow-up monitoring, tracking of emerging new knowledge and periodic review of decisions from time to time in light of new information and knowledge.



SECTION 5.0

THE DIMENSIONS OF NORTHERN WATER MANAGEMENT

ASSESSING WATER NEEDS

5.0 THE DIMENSIONS OF NORTHERN WATER MANAGEMENT - ASSESSING WATER NEEDS

A strategy must address a set of primary needs. Based on the findings of the Water Wise Conference (2007) and the Water Strategy Working Group comments, the following primary needs have been identified:

- Human Sustenance Needs
- Ecosystem Needs
- Traditional Cultural Needs
- Economic Needs

These needs have been expressed as the water resources management matters of greatest importance to the NWT. A strategy should address each need by identifying in a specific goal that is responsive to the need and the identification of associated objectives that must be met to fulfil the goal.

5.1 HUMAN SUSTENANCE NEEDS

Satisfying human sustenance needs (i.e., the water required to sustain human life) is the top priority of an NWT Water Resources Management Strategy. This section should provide a framework for meeting human sustenance needs.

5.1.1 Primary Human Sustenance Goal

The human sustenance goal of this strategy is:

To provide as efficiently as possible an adequate quantity of high quality potable water for all residents of the NWT, now and into the future. This refers not only to supplies of treated water but to the source waters on which communities depend.

5.1.2 Human Sustenance Objectives

The following objectives serve to meet this goal.

Drinking Water Quality

Drinking water shall meet or exceed national drinking water standards. Source water protection measures shall ensure that the water supply is of high quality, including measures to establish source protection areas.

Wastewater Treatment - Human Health

Domestic and industrial wastewater shall be treated to the extent that the quality of the effluent does not pose an unacceptable risk to human health.

Human Sustenance Adequacy, Optimality and Trade-Offs

Water pricing based on full cost accounting principles shall be used as a tool for ensuring the wise use of water, minimizing wastage and avoiding excessive public expenditures on infrastructure.

Demand for potable water varies according to socio-economic and situational factors such as location. Despite the apparent abundance of water in the NWT, provision of potable water and wastewater treatment are expensive undertakings in many instances. Furthermore, increased extraction of water increases the potential for changes in quality, contamination and/or downstream damages. An NWT Water Resources Management Strategy should promote the wise use of water.

5.1.3 Work Plan Actions

A detailed draft Plan for Action might identify the specific tasks that could be undertaken to develop the Human Sustenance Needs section of an NWT Water Resources Management Strategy. The following action items could contribute to the development of this section:

- *Describe the Hydrological System*
 - *Develop Physical Flow Network*
 - *Establish Weather/Climate Variables*
 - *Establish Surface Water Variables*
 - *Establish Groundwater Variables*
 - *Define Watershed Systems*
 - *Calibration/Verification of System Components*
- *Characterize Human System*
 - *Potable Water*
 - *Economic Uses*
 - *Non-market Uses*

5.2 ECOSYSTEM NEEDS

Sustaining healthy terrestrial and aquatic ecosystems is a priority for an NWT Water Resources Management Strategy. This section could provide a framework for meeting ecological water needs and for maintaining the ecological integrity of the NWT.

5.2.1 Ecosystem Sustenance Goal

The ecosystem sustenance goal of this strategy is:

To provide an adequate quantity of high quality water over all seasons of the year as efficiently as possible so that the health of the terrestrial and aquatic ecosystems throughout the NWT will be sustained for the foreseeable future.

5.2.2 Ecosystem Sustenance Objectives

The following objectives serve to meet this goal:

Ecosystem Stocks and Flows

Water management shall ensure adequate quantities and quality of both water levels and flows.

Water levels and flows are critical to ecosystem health. Ecosystem needs vary from location to location. Water quality is tied closely to quantity. For these reasons, both water quantity and quality should be managed at a watershed level to provide the conditions necessary for ecosystem health.

Valued Ecosystem Components

Water management shall focus on sustaining optimal supplies of valued ecosystem components (VECs) connected with the NWT water resources.

Certain components of ecosystems are of direct and particular relevance and importance for social well-being. Practical and effective water resources management requires that effects on specific ecosystem elements be measured, assessed and forecasted. Water management requires that ecosystem components that will be used for evaluating water resources management alternatives be identified. For these reasons, valued ecosystem components (VECs) are being used, and should continue to be used to guide many water resources management decisions. These VECs may vary from location to location and over time. Arriving at a manageable set of VECs is essential and requires a collaborative process involving all interests (residents, industry, governments, Aboriginal organizations, non-government organizations and special interest groups).

Ecosystem Adequacy, Optimality and Trade-Offs

Water management decisions shall evaluate the implications of water resources management alternatives on ecosystems as a whole and on specific VECs. Water management decisions shall ensure, at a minimum, adequate water quantity and quality to sustain key VECs and overall ecosystem health.

The health of an ecosystem is at increased risk as the available quantity and/or quality of water declines. Many water resources management decisions involve balancing this risk with water demands and uses for human activities. This balancing process shall be undertaken using the best available traditional knowledge and science, with the input and full consideration of the views and needs of water partners and with regard to the interests of present and future generations. A critical requirement of this decision-making process is that all decisions are based on an explicit and transparent process of balancing varied interests and ecological and human factors.

5.2.3 Work Plan Actions

A detailed draft Plan for Action might identify the specific tasks that could be undertaken to develop the Ecosystem Needs section of an NWT Water Resources Management Strategy. The following action items could contribute to the development of this section:

- *Characterize Terrestrial Ecosystem*
- *Characterize Wetland Ecosystem*
- *Characterize Aquatic Ecosystem*

5.3 TRADITIONAL CULTURAL NEEDS

Satisfying human traditional and cultural needs is a priority for an NWT Water Resources Management Strategy. This section should provide a framework for meeting these traditional and cultural needs.

5.3.1 Traditional Cultural Goal

Informed by and reflecting the rich and diverse Aboriginal history of the land, the traditional cultural goal of this strategy might be:

To provide an adequate quantity and quality of water as efficiently as possible to satisfy the traditional cultural needs of the NWT's Aboriginal people, as well as the cultural needs of other groups.

5.3.2 Traditional Cultural Objectives

The following objectives serve to meet this goal.

Harvesting and Traditional Cultural Demand

Adequate quantity and quality of water shall be provided to satisfy subsistence harvesting and traditional cultural needs.

Traditional cultural needs may vary from location to location and from community to community. For this reason, traditional cultural needs should be carefully and accurately assessed in terms of both water quantity and quality. A key part of this process could be to derive suitable methods and measures for determining the traditional cultural needs at a community level.

Traditional Cultural Optimality and Trade-Offs

Water management decisions shall be made after evaluating the implications of water resources management alternatives on traditional cultural needs at specific locations throughout a watershed. Water management decisions shall ensure adequate water quantity and quality to satisfy these traditional cultural needs.

Water quantity and/or quality for traditional cultural needs is not absolute; instead, the benefit from traditional cultural uses diminishes as the quantity and/or quality of water declines. Many water resources management decisions involve balancing these benefits with other water demands and uses associated with other human activities. This balancing process shall be undertaken using the best available traditional knowledge and science, with the input and full consideration of the views and needs of water partners and with regard to the interests of present and future generations. A critical requirement of this decision-making process is that all decisions are based on an explicit and transparent process of balancing varied interests and ecological and human factors.

5.3.3 Work Plan Actions

A detailed draft Plan for Action might identify the specific tasks that could be undertaken to develop the Traditional Cultural Needs section of an NWT Water Resources Management Strategy. These actions should be discussed and verified with NWT Aboriginal groups and others. The following action items could contribute to the development of this section:

- *Characterize Spiritual/Cultural/Traditional Uses*

5.4 ECONOMIC NEEDS

Satisfying the water needs associated with economic activities is a priority for an NWT Water Resources Management Strategy. This section should provide a framework for responding to and meeting these economic needs.

5.4.1 Economic Goal

The economic needs goal of this strategy might be:

To provide an adequate quantity and quality of water as efficiently as possible to fulfil the needs of the NWT economy both now and in the future.

5.4.2 Economic Objectives

The following objectives could serve to meet this goal.

Economic Demand

The quantity and quality of water required to satisfy economic needs shall be clearly articulated in measurable terms.

Water needs for economic activities vary significantly from location to location and from time to time. For this reason, economic water needs should be assessed locally in terms of both water quantity and quality and updated periodically.

Water Levels and Flows

Water management shall ensure that adequate water levels and flows and quality of water are available to meet local water needs for economic activities.

Many economic activities depend both on the quantity of water (referred to as the “stock” of water) in a water body (e.g., lake levels) and on the flow of water through the water body. Water management should ensure that the quantities and quality of both water stocks and flows are adequate.

Wastewater Treatment - Human and Ecosystem Health

Wastewater from economic activities shall be treated so that the quality and quantity of the treated effluent does not adversely affect other water values and uses.

The required level of wastewater treatment directly affects treatment costs but also influences directly the risk of downstream damages. A critical water resources management decision by water managers is the level of wastewater treatment that is required at any location within a watershed.

Economic Adequacy, Optimality and Trade-Offs

Water pricing shall be used to ensure the wise use of water and to minimize wastage. Water prices shall reflect the full cost of supplying and treating water and wastewater associated with economic activities.

The quantity and/or quality of water required to satisfy economic needs must be balanced against the costs of supplying water and treating wastewater. Water prices should reflect the full cost of supplying water and treating wastewater plus the downstream opportunity costs associated with any residuals released to the environment.

5.4.3 Work Plan Actions

A detailed draft Plan for Action might identify the specific tasks that could be undertaken to develop the Economic Needs section of an NWT Water Resources Management Strategy. The following action items could contribute to the development of this section:

- *Characterize Economic Uses*
- *Characterize Non-market Uses*



WATER MANAGEMENT DECISION-MAKING SUPPORTING PROCESSES

SECTION 6.0

6.0 WATER MANAGEMENT DECISION-MAKING - SUPPORTING PROCESSES

6.1 WATER MANAGEMENT DECISION-MAKING

Water management involves striving to sustain and improve social benefits. Water management is a process in which future possibilities are identified and evaluated against other possibilities and their individual performance is measured by the achievement (or lack thereof) of specific goals and objectives. In short, water resources management requires making conscious informed decisions about the wise use of water resources. This section of the strategy could be used to provide guidance to all water management decision-makers (GNWT, INAC, land claims organizations, land and water boards and others) for making water resources management decisions.

6.1.1 *Management Goal*

Water management decisions shall be guided by the overriding goal of maximizing net⁸ social benefits over the short and long-term.

The ultimate goal of water resources management is to sustain and improve social well-being; that is the overall collective well-being of the residents of the NWT. This goal will require that water managers demonstrate explicitly how major water decisions will result in the greatest improvement in the net benefit supplied by the NWT's water resources. Doing so is a major challenge that will require data, science, traditional knowledge, significant resources, supporting technology, extensive engagement and consultation and a commitment from NWT water partners and communities. To support an NWT Water Resources Management Strategy, guidance could be provided to water managers on the importance, interpretation and practical application of this overarching management goal.

⁸ The concept of net benefit is central to this strategy. Every decision involves trade-off, what are commonly referred to as costs and benefits. For example, harm to the environment is a form of cost. Net benefit is the difference between the gross benefits and the costs of an alternative. The greater the net benefit, the greater will be the improvement to social well-being.

6.1.2 Consideration of Alternatives

Every water resources management decision shall be required to identify and examine systematically a reasonable range of reasonable alternatives. The number and scope of alternatives shall be commensurate with the scale of the effects associated with the management decision.

Water management decision-making involves choosing from among the available alternative courses of action. The larger the potential effect of a decision, the greater the need for choosing the best alternative. Creativity in designing water resources management alternatives is essential; at the same time, a strong dose of practicality and common sense is needed.

6.1.3 The Unconstrained Alternative

The starting point for the search for the best management alternative shall always be the “clean slate” or unconstrained alternative.

The unconstrained alternative should be constrained only by the physical and ecological elements of the watershed. The idea is to find the water resources management alternative that would yield the greatest improvement in social well-being (i.e., the greatest net benefit) if legal and political constraints were not present. In other words, the theoretical “clean slate” alternative would not be constrained by laws, water rights or issues of fairness or financial feasibility.

Clearly, the unconstrained alternative is impractical. The purpose of the unconstrained alternative is to serve as a benchmark for comparison with all other management alternatives under consideration. More specifically, the unconstrained alternative provides an efficient means for calculating and understanding the opportunity costs (i.e., foregone benefits) that result from practical constraints such as water rights, laws, agreements and considerations of fairness and equity. This information can facilitate positive dialogue among parties on how much all might greater benefit by overcoming or relaxing existing constraints

6.1.4 Systematic Evaluation of Alternatives

All water resources management decisions shall be based on a systematic evaluation of the expected outcomes of the alternatives considered.

Choosing the best water resources management alternative is often controversial. What is best typically varies from one perspective to another (i.e., from the perspective of a beneficiary or water partner). Every water resources management alternative involves trading off benefits and costs. A systematic evaluation of alternatives tied directly to quantitative forecasts of the expected outcomes for each alternative serves several purposes.

The results of the evaluation process provides a clear rationale for choosing the preferred (i.e., best) water resources management alternative. A systematic evaluation will also reveal the distribution of benefits and costs among water partners. The result is that all water partners are provided with the information necessary to understand why an alternative is preferred and to alleviate concerns of bias or prejudice in water resources management decisions. Such concerns can undermine community commitment to collective water resources management for the betterment of all.

To sustain the integrity of water resources management, water users must have a shared common view of the value of collective management and the benefits that will be derived for all water partners.

6.1.5 Need for Measurable Outcomes

Water management decisions shall include specific forecasts of measurable quantitative outcomes that are expected as the management action(s) are implemented and thereafter.

A basic principle of water resources management and other forms of resource management as well, is that one can only manage what one can measure. Without measurable outcomes to assess and improve

management over time, not only does the management system stagnate but the confidence of water partners in the management will wane quickly as well. For this reason, measurable outcomes are an essential core requirement for application of the adaptive management process. These measurable outcomes form the basis for future learning and improved understanding that can be applied in future water resources management decisions. To support an NWT Water Resources Management Strategy, guidance documents could be drafted to establish a suitable suite of measurable outcomes.

6.1.6 Knowledge-based Quantitative Forecasts

Water management decisions shall be supported by knowledge-based quantitative forecasts that make the best use of the best available information.

Water management involves managing the physical/biological environment and the human uses that are dependent on the environment. Water management involves a large array of factors and relationships that are complex and dynamic. Informed water resources management requires making the best use of the best available information through knowledge-based quantitative forecasts of water resources management alternatives, combined with the need to consider a range of management alternatives. The supporting knowledge base will be derived from conventional scientific and traditional knowledge sources. This knowledge base will be subject to regular tests for veracity. In most cases, water resources management decisions will be assisted by the use of modern information technology (e.g., GIS, relational databases, computer models and decision-support systems). To support an NWT Water Resources Management Strategy, the process for developing this knowledge base and the related analytical tools could be developed in conjunction with water managers and water users.

6.1.7 Balancing of Short and Long-term Outcomes

Water management decisions shall use explicit procedures to balance short-term vs. long-term costs and benefits.

Some outcomes of water resources management decisions will materialise immediately; others may emerge over many years. Special consideration needs to be given to trading off short-term vs. long-term outcomes. This process of balancing future benefits and costs is controversial and should be undertaken in close consultation with all communities and water partners and should be based on a systematic, technically and explicit procedure. Guidance and training on the procedure and process for balancing short-term vs. long-term costs and benefits could be developed to support an NWT Water Resources Management Strategy.

6.1.8 Distributional Issues

Water management decisions shall deal explicitly with the distribution of benefits and costs among individuals and communities. Where significant inequities are present, water managers shall devise acceptable means to improve the distribution among all those affected by a proposed water resources management decision.

Improving the overall collective well being of the residents of the NWT is the ultimate objective of water resources management. However, this improvement must occur fairly among the many individuals and communities that may be affected by water resources management decisions. Distributional issues should be addressed AFTER the best alternative is identified. Resolving distributional issues could be approached following these three steps:

1. Identify the primary individuals or communities that will be affected by a decision and estimate the expected net result for each group.
2. Arrive at a collective determination through consultation with all affected parties as to the scale of imbalance requiring action. (Minor imbalances are inevitable and it is impractical to resolve each and every imbalance to the satisfaction of everyone.) This determination must be done in an open, transparent and interactive forum involving all affected parties.

3. Search for the most efficient and fair means to redistribute benefits and costs among the parties. If the required transactions costs⁹ associated with redistribution are large, this may be sufficient cause to revisit the decision on the best alternative.

To support an NWT Water Resources Management Strategy, the procedure and process for resolving distributional inequalities should be determined. Providing guidance for water managers through training could be a part of this process.

6.1.9 Collaboration and Communication

Water management decisions shall be made through an open and inclusive process involving all potentially affected interests.

Effective integrated watershed management demands that all water users (GNWT, INAC, land claims organizations, land and water boards and others) are committed to the overarching management goals and the principles of integrated management. In specific instances and circumstances particularly at the local level at a single point in time, the need for and advantages of integrated watershed management are sometimes difficult to appreciate. Water management decisions involve difficult trade-offs for which there is no “right” answer and which often involve balancing the interests of one group with another.

Collaboration and communication with water users is critical to gain understanding and support for water resources management. As well, trade-offs should reflect the priorities and preferences of water users - information only water users can provide. Water users must see water resources management as being driven by their interests and in their collective best interest. To support an NWT water Resources Management Strategy, the procedure and process for collaboration and communication with water users should be determined. As with other elements of the developing strategy, providing guidance for water managers through training could be a part of this process.

6.1.10 The Role of Science, Traditional Knowledge and Technology

Water management decisions shall make the best use of a combination of conventional scientific data and knowledge and traditional data and knowledge. These data and knowledge shall be applied to inform water resources management decisions using appropriate technological capacity.

Scientific data and knowledge are valuable for anticipating how water resources are likely to respond to management actions. This understanding can be valuable in assisting with making better water resources management decisions. For example, Science in the Changing North is a vehicle for exchanging resource management information that can be used for decision-making.

Scientific knowledge and data, however, have well-known limitations. For this reason, Traditional Knowledge must continue to be considered in combination with scientific knowledge to overcome gaps and deficiencies. Those people who live on the land see first hand what is happening and have a full-time presence that science cannot match. These knowledge sources strongly complement each other.

Governments conduct limited “scientific research”; at the same time universities and industry also conduct research and develop new technology useful for water resources management. A strategy should engage a broad range of researchers and industry. To support an NWT Water Resources Management Strategy, a procedure and process for compiling, synthesising and regularly updating the supporting knowledge base for an integrated watershed management system should be developed. Providing guidance for water managers through training could be a part of this process.

⁹ The term “transaction costs” refers to the administrative and social costs involved in determining and resolving imbalances among benefits and costs. For example, imagine that one community would realize \$1 million more in benefits than another and everyone agreed that this distribution was unfair and that \$300,000 of the benefit should be redistributed to the other community. However, collecting and redistributing the money (e.g., tax and benefit payment programs) would cost say, \$250,000. This \$250,000 would be considered part of the transaction cost for this benefit redistribution program.

6.1.11 Performance Assessment

Water management decisions shall be subject to regular performance assessments by comparing expected outcomes to actual outcomes.

Water management must be guided by the need for continuous learning and improvement. To do so requires rigorous application of adaptive management principles. A key aspect of the cycle of adaptive management continuous learning and improvement is reporting management successes and failures to water users and keeping them abreast of initiatives arising from this learning. Water managers should accept and embrace the principle of regularly assessing the performance of water resources management decisions through an inclusive, open and constructive process. The goal of this process is not to “discipline” water managers but to improve water resources management for the benefit of all. To support an NWT Water Resources Management Strategy, the procedure and process for assessing the performance of water resources management decisions should be developed. Providing guidance for water managers through training could be a part of this process.

6.1.12 Work Plan Actions

A detailed draft Plan for Action might identify specific tasks that could be undertaken to develop the water resources management decision-making section of an NWT Water Resources Management Strategy. The following action items could contribute to the development of this section:

- *Develop Guidance for Identifying Alternatives*
- *Develop Guidance for the use of the Unconstrained Alternatives*
- *Determine Evaluation of Alternatives Protocol*
- *Design Valuation Methodology*
- *Establish Quantitative Forecast Methods*
- *Procedure Guidance Protocol for Reporting and Resolving Distributional Issues*
- *Develop Protocol for Integrated Water Management Decision-making*
- *Develop Protocol for Use of Traditional and Local Knowledge in Decision-making*
- *Develop Performance Assessment and Evaluation Process*
- *Design and Implement Water Management Training Program*

6.2 COORDINATION OF WATER RESOURCES MANAGEMENT

The preceding sections have outlined the fundamentals for making water resources management decisions. This decision-making process requires an efficient and effective administrative structure and information system to facilitate and support these decisions. This section should describe the key administrative elements required to implement integrated watershed management in the NWT.

6.2.1 Management Hierarchy: Watershed Management

Water management decisions shall be undertaken with a hierarchically organised watershed context. Water management decisions shall be consistent from both top-down and bottom-up perspectives.

Water management decision-making should be structured on the inherent hierarchy of watershed systems. Where decision-making is de-centralised, the watershed hierarchy should serve as the foundation for coordinating decisions and the management organisation should reflect these relationships. The management organisation should accord with the connections from local tributaries and basins to major water bodies and watersheds. Not only should management responsibilities be aligned around watershed units, so too should watershed management plans, rights, and forecasts of expected outcomes.

Maintaining internal consistency from one level in the hierarchy to another is critical. Doing so requires that common data and decision-making processes are used. Furthermore, water resources management

decisions must be based on a top-down/bottom-up process whereby local decisions are guided by broader decisions and the effects of local decisions are built into broad scale decisions. Guidance documents and training should be created to support water managers in organising and coordinating water resources management decisions.

6.2.2 Management Responsibilities

Specific water resources management decision-making responsibility shall be assigned to a single point of accountability within each watershed unit. The scope of potential decisions and the limitations on those decisions shall reflect both higher level and lower level management decisions and commitments.

Responsibility for making, implementing and monitoring the effects of water resources management decisions within a watershed unit must be clearly defined, and ultimately rest with a single, clearly identified entity. If other government departments or agencies or even different levels of government are involved, their efforts must all funnel through a common agency responsible for ensuring a coordinated management decision-making process and consistent and coordinated implementation and monitoring of management actions. This section should elaborate on the specific management decisions that could be assigned to different elements and levels within the management hierarchy. It may also outline the responsibilities of the decision-makers to communicate their intentions and to ensure that their decisions are consistent with those being made within other elements of the management hierarchy. There clearly will need to be full consideration of the various existing mandates and authorities across the NWT, which reflect in part Aboriginal rights and land claim provisions. Guidance documents and training for water managers can help to enable the specific management decisions assigned to different elements and levels within the management hierarchy. This will ensure that their decision-makers succeed in their responsibilities to communicate their intentions and to ensure that their decisions are consistent with those being made within other elements of the management hierarchy.

6.2.3 Environmental Effects and Risk Management

Specific responsibility shall be assigned to undertake explicit risk management analyses of proposed water resources management alternatives with the objective being to maximise upside risks and minimise downside risks.

Prudent water resources management decision-making requires an assessment of the up-side and down-side risks of proposed water resources management actions for potentially affected communities and individuals. Risk assessment protocols will be required to ensure comprehensive and consistent risk assessments. These protocols should deal specifically with cumulative environmental effects. To help support an NWT Water Resources Management Strategy, the procedures for the consistent application of risk assessment protocols may be drafted and water managers trained in their use.

6.2.4 Infrastructure and Funding

Specific responsibility shall be assigned to evaluate regularly the implications of water resources management decisions in terms of the need for infrastructure capacity and associated funding.

An important part of water resources management in the NWT is the provision of potable water and wastewater treatment services. The need for these services and their level of treatment is influenced by local and, in some cases, regional watershed management decisions, among other things. Specific responsibility needs to be assigned to track human sustenance water needs, the capacity of existing infrastructure systems, to identify system deficiencies, to prioritise and plan system capacity expansion, maintenance and upgrades and to seek adequate funding for these projects.

Often these types of responsibilities are largely disconnected from broader watershed management decision-making. The management organisation should ensure a strong connection between local water infrastructure decisions and other water resources management decisions. To support an NWT Water Resources Management Strategy, the drafting of guidance documents and the development of a training program for water managers may be undertaken. These initiatives could help describe how water

infrastructure needs should be identified and prioritized, how adequate funding should be secured to build, operate and maintain water infrastructure, and on how infrastructure management decisions should be integrated with other watershed management decisions.

6.2.5 Inter-jurisdictional Coordination

Specific responsibility shall be assigned to ensure coordination of water resources management decisions with external agencies and jurisdictions to maintain consistency from location to location and from time to time throughout shared watersheds.

A series of water resources management agreements exist between the GNWT, Canada and other adjacent jurisdictions. These agreements precede this water resources management strategy. Other agreements are being negotiated or will be in the future. The provisions of these agreements need to be melded with the basic principles and procedures on which a future NWT Water Resources Management Strategy is based. The procedures and processes should be integrated with existing and new agreements. Consideration should be given to future modifications that the NWT may wish to make to these agreements. As with other elements of the developing strategy, providing training for water managers should be a part of the process.

6.2.6 Accountability for Actions

Specific responsibility shall be assigned to conduct periodic independent reviews of the implementation of water resources management decisions to ensure that planned water resources management actions are being carried out.

Water managers face a difficult task. However, accountability of water managers for their decisions and advice is essential to maintain public confidence and commitment to cooperative integrated water resources management. The challenge is to hold water managers accountable for those elements of the management process that are within their control, and not to do so for elements outside their control.

For example, the success of the adaptive management process requires managers to identify and make explicit unexpected outcomes that in some cases may not be favourable. Commonly when management forecasts fail to materialize, some will claim this is evidence of errors for which managers should be held accountable. This approach to accountability can undermine sincere efforts to implement adaptive management. The bases on which water managers will be held accountable need to be clearly articulated and must not include system performance factors having high levels of uncertainty and imprecision. To support an NWT Water Resources Management Strategy, a procedure and process for assessing and communicating the performance of water managers in terms of responsibly implementing water resources management activities should be determined. As with other elements of the developing strategy, providing training for water managers should be a part of the process.

6.2.7 Work Plan Actions

A detailed draft Plan for Action might identify some specific tasks that could be undertaken to develop the water resources management decision-making organisational system section of an NWT Water Resources Management Strategy. The following action items could contribute to the development of this section:

- *Define and Assess Organizational Options*
- *Describe the NWT-focused Water Management Structure*
- *Describe Protocol for Guiding Water Infrastructure Investments*
- *Establish Inter-jurisdictional Coordination Protocol*



SECTION 7.0

MONITORING AND SUSTAINABILITY ACCOUNTING

7.0 MONITORING AND SUSTAINABILITY ACCOUNTING

7.1 SUSTAINABILITY ACCOUNTING

Measuring progress toward satisfying the ultimate goal of sustaining and improving social well-being through wise water resources management is essential. Water management, however, involves an ongoing never-ending stream of management decisions at various locations, scales and time periods. Determining the net effect of these decisions on social well-being and the NWT's natural capital wealth is difficult, particularly from a narrow, local, point-in-time perspective. This section should provide a possible framework for tracking changes in the NWT's natural capital account for water. The results of this tracking will provide the NWT with guidance and feedback on the sustainability of its water resources management decisions and enable strategic options to be developed, particularly in respect of inter-jurisdictional dialogue.

7.1.1 A Rigorous Accounting Framework

A robust and balanced natural capital accounting framework shall be developed to evaluate the sustainability of the NWT's water resources and the effectiveness of its water resources management system.

Natural capital accounting is an emerging discipline. The need for natural capital accounts has been recognized for many decades but the precise nature of these accounts remains a source of intense discussion and research. The essential requirements for any wealth accounting system are well established, largely through adherence to nationally and internationally accepted accounting principles and standards, extensive experience working with conventional national and provincial income and wealth accounts. The nature of the natural capital accounting framework that will be used to track water wealth over time in the NWT is an important decision. The design and essential features of a water natural capital accounting framework should be considered as part of the process of creating an NWT Water Resources Management Strategy.

7.1.2 Statistics and Monitoring

A systematic process for prioritising water resource monitoring and statistical collection programs shall be developed and used to allocate resources for monitoring.

Keeping the NWT's water knowledge base current and evaluating the status of its water resources requires an ongoing commitment of resources to data collection and monitoring. This information is critical for making informed water resources management decisions and for learning from past management practices. Invariably, the demand for statistics and monitoring exceed the resources available and difficult decisions on priorities must be made. Prior to investing in monitoring and data collection, the expected net benefit should be estimated in terms of improving future water resources management decisions. The highest priority should be given to data collection that will yield the greatest return in terms of understanding and improving water resources management decisions.

An important use of monitoring statistics will be to support the water natural capital accounting system. For this reason, monitoring is not limited strictly to measuring water quantities and quality; monitoring should also measure the benefits being realised from the NWT's water resources. To support an NWT Water Resources Management Strategy, a prioritisation process for allocating available monitoring resources and for designing statistical collection programs for water resources should be developed.

7.1.3 Physical Measurement of Water Capital

A technically sound system for categorising water into relevant "commodity" classes that are relevant to NWT water uses and values and that is consistent with natural capital accounting principles shall be developed, tested and applied.

Measurement of the natural capital associated with the NWT's water resources involves physical measures of water quality and quantity. These physical measures must be tied closely to the benefits from water resources to be realised by the people of the NWT. On the other hand, the diversity of water quality measures, not to mention the different measures of water quantity, result in the potential for a great diversity of water "types". A systematic classification of water types is required to organise data collection and interpretation within an accounting framework. The procedure for developing and applying a water "commodity" classification system consistent with the water natural capital accounting framework should be produced to support an NWT Water Resources Management Strategy.

7.1.4 Synthesis of Diverse Components

A technically sound system for the valuation of water uses and values that is consistent with natural capital accounting principles shall be developed, tested and applied.

To determine if the water wealth of the NWT is being sustained or increased over time, diverse physical measures of the water resource should be synthesised into a lump-sum bottom-line. Doing so requires converting the physical measures of water resources into commensurate units that can be added together (i.e., the valuation of water resources).

Determining the value of water resources for supporting the needs and values of the people of the NWT is complex given the diversity of uses and values associated with water, the wide variation in the physical state of water and the great variation in water uses and values from location to another. The valuation of water goods and services is challenging and requires specialized methods. The values assigned to these goods and services must reflect the desires and priorities of the people of the NWT. The procedure for valuing the natural capital associated with water resources should be produced to support an NWT Water Resources Management Strategy. This will allow consistent accounting of the status of water natural capital from one year to the next.

7.1.5 Regular Reporting

A system for annual reporting of the state of the NWT's water resources and their natural capital value shall be developed, tested and applied.

These annual reports will provide valuable information to decision-makers; but perhaps of equal or greater importance - this information will assist the people of the NWT to gain a sound understanding of

the contribution of water resources to the overall wealth of the NWT and the well-being of its people. The public will have a reliable basis to gauge and track the status of their water wealth. This understanding will reinforce the need for vigilant and sustained collective commitment to integrated watershed management. To support an NWT Water Resources Management Strategy, a procedure could be developed for preparing annual reports and for determining their contents.

7.1.6 Work Plan Actions

A detailed draft Plan for Action might identify the specific tasks that could be undertaken to develop the sustainability accounting section of an NWT Water Resources Management Strategy. The following action items could contribute to the development of this section:

- *Develop Accounting Framework*
- *Develop Statistics and Monitoring Approach*
- *Develop Water Capital Metrics*
- *Develop Process for Valuations of Water*
- *Develop Water Management Reporting Protocols*

7.2 WATER RESEARCH

Water resources management involves managing complex hydrological and ecological systems and responding to a complex interaction of demographic, socio-economic and cultural factors. New approaches and tools to assist water managers are continually being developed. As well, the NWT may initiate independent research designed to address NWT water issues. This section outlines the process that could be used to stay abreast of and to make the best use of water resources management research results and to identify and evaluate the need for NWT research initiatives.

7.2.1 Procedure for Tracking Water Research

A systematic procedure for tracking new developments in water resources management shall be developed, tested and applied.

An important element in making informed water resources management decisions is to ensure that water managers have access to the best available information. The best available information is constantly changing as new research results come available and new knowledge is gained. This section will describe the procedures that could be followed to track significant new developments in water resources management research and how these new developments should be incorporated in this water resources management strategy. Procedures should be developed for tracking significant new developments in water resources management research and incorporating them in the NWT's water resources management system. Providing guidance and training for water managers will help to support an NWT Water Resources Management Strategy.

7.2.2 Water Supply

A systematic procedure for periodically evaluating the significance of gaps in water supply information and understanding shall be developed, tested and applied.

Water research can be divided conceptually into two broad categories: water supply and water demand. The water supply category includes all aspects relating to the quantity and quality of water. To support an NWT Water Resources Management Strategy, a procedure for identifying the most pressing water research needs relating to water supply in the NWT should be developed.

7.2.3 Water Demand

A systematic procedure for periodically evaluating the significance of gaps in water demand information and understanding shall be developed, tested and applied.

Water demand includes all aspects relating to the demand for water (i.e., human sustenance, ecological, traditional cultural and economic needs). To support an NWT Water Resources Management Strategy, a procedure for identifying the most pressing water research needs relating to water demand in the NWT should be developed.

7.2.4 Evaluation of Potential Research Investments

A systematic process for prioritising water resource research programs shall be developed and used to allocate resources for research.

Invariably, the demands for research exceed available resources. As a result, research needs must be prioritized and scarce research dollars need to be invested wisely to yield the greatest public benefit. Deciding on the best allocation of scarce of research dollars must be done systematically and consistently. To support an NWT Water Resources Management Strategy, a procedure for allocating available resources for water resources research should be developed.

7.2.5 Work Plan Actions

A detailed draft Plan for Action might identify the specific tasks that could be undertaken to develop the water resources research system section of an NWT Water Resources Management Strategy. The following action items could contribute to the development of this section:

- ***Establish Water Research Program***
 - *Tracking Procedures*
 - *Water Supply*
 - *Water Demand*
 - *Research Investment Evaluation*



SECTION 8.0

CURRENT AND EMERGING ISSUES

8.0 CURRENT AND EMERGING ISSUES

The NWT is currently facing a number of challenging water resources management issues. As well, a number of emerging issues are evident on the horizon. In addition, new water resources management issues are likely to emerge in the future. This section should critically examine these current and emerging issues within the management framework set out in the preceding sections of this document. It is also suggested that a process for identifying and prioritizing new emerging issues be described.

8.1 CURRENT AND EMERGING ISSUES

8.1.1 Land-Use Planning Framework

The linkages between land-use planning and water resources management should be addressed. This section should identify the nature of the linkage between an NWT Lands Framework by providing suggestions as to how the Lands Planning Initiative can support a water resources management strategy, and vice versa.

8.1.2 Water Related Rights & Responsibilities

One of the major challenges in effective water resources management and achieving the maximum social benefit from water resources is ambiguous and/or conflicting water rights. It is proposed that this section critically examine the current suite of water rights, regulations, policies and responsibilities in the NWT and identify:

- Major conflicts among these commitments,
- Major gaps where water commitments have not been clearly determined,
- Instances where significant ambiguity exists in terms of existing commitments, and
- Full assessment of Aboriginal rights related to all treaties and local claims.

This section, following discussions with Aboriginal groups and others, should conclude with a road map for establishing a comprehensive and clear set of water rights for the NWT.

8.1.3 Cumulative Effects

Managing human impacts requires an understanding of the current and future effects of human activities including pollution. These effects may accumulate over time and present complex challenges with high levels of uncertainty. This section should describe how a strategy should address and incorporate cumulative effects in the water resources management system.

8.1.4 Transboundary Water Issues

Much water enters the NWT from other jurisdictions. These jurisdictions will not be bound by an NWT Water Resources Management Strategy. Transboundary coordination of water resources management is addressed through bilateral agreements. It is proposed that this section sets out how the NWT can influence the upstream management of transboundary systems (in regards to hydroelectric development or petroleum exploration, for example) and how the NWT should account for downstream uses outside of its jurisdiction in its water resources management decisions.

8.1.5 Climate Change

Climate change is a major emerging issue that may significantly affect NWT water resources in the short and long term. This section should examine the nature, magnitude and expected timing of the risk posed by climate change and how potential climate change impacts may be addressed through the water resources management system.

8.1.6 Bulk Exports

Fresh water is a scarce global resource. Increasing humanitarian and economic pressures will be experienced by the NWT to reconcile the spatial imbalance in water availability, particularly for human sustenance needs. This section is intended to set out a framework for assessing future demands for bulk water exports, for evaluating the implications for the NWT and for reconciling these demands through the water resources management system.

8.1.7 Screening Procedures for New Emerging Issues

Undoubtedly, the NWT will face new, as yet unforeseen, water resources management issues in the future. Water managers and the public need to be informed of significant new emerging issues as soon as possible so that water resources management decisions can capitalize on new opportunities and can help reduce the risks of new threats. This section should set out a deliberative proactive process whereby the NWT can be vigilant in identifying, evaluating and appropriately reacting to potentially significant new emerging issues.

8.1.8 Work Plan Actions

A detailed draft Plan for Action might identify the specific tasks that could be undertaken to develop the section of an NWT Water Resources Management Strategy dealing with current and emerging issues. The following action items could contribute to the development of this section:

- *Develop Linkages and Integrate Relationship of NWT Water Management with NWT Land Management*
- *Review of all NWT Water Related Agreements and Commitments - Develop Response Strategies*
- *Review and Assess Global Water Trends and Drivers*
- *Inventory and Evaluate:*
 - *Transboundary Water Management Issues*
 - *Climate Change Issues*
 - *Bulk Export/Basin Transfer Issues*
 - *Cumulative Effects Issues*



SECTION 9.0

WATER RESOURCES MANAGEMENT STRATEGY COLLABORATION & COMMUNICATION

9.0 WATER RESOURCES MANAGEMENT STRATEGY COLLABORATION & COMMUNICATION

The work conducted to date to draft *Towards a Water Resources Management Strategy for the Northwest Territories - A Discussion Paper on Strategy Development* has been done by a Water Strategy Working Group. This group consists of representatives from both the territorial and federal governments. However, the need for a water resources management system in the NWT has been expressed in a number of forums by many residents. This voice, as it has been heard to date, has been incorporated in this proposed approach to strategy development. This document is intended to spark further discussions that reflect the interests of all NWT water partners. Only by drawing on our collective knowledge and energy can we develop a strategy that will ensure the sustained health and well-being of the environment and people of the NWT.

9.1 COLLABORATION AND COMMUNICATION

Communication is key to establishing the dialogue necessary to build a water resources management strategy that meets the needs of all NWT water partners. This section should focus on the engagement process and logistics required to ensure a Northern Voice is heard throughout the development and implementation stages of this initiative. The GNWT and INAC are committed to working with all parties in the NWT with an interest in water management.

It is anticipated that through the release of this discussion paper, water partners will be introduced to the proposed approach to water management and essential water-related discussions will be triggered. This approach will be presented at Aboriginal assemblies during summer 2008 in order to kick-start the engagement process. This will provide an opportunity for Aboriginal leadership and communities to share knowledge, input and advice on water issues. The approach will also be shared with a wider audience at various public forums. A detailed Collaboration and Communication Plan is being drafted. A transparent engagement process with Northerners is critical to defining our Northern Voice as it relates to water resources management --- including guiding principles and overall goals.

For more information on *Northern Voices, Northern Waters - Towards a Water Resources Management Strategy for the Northwest Territories* and the development of a territorial water resources management strategy, please contact Environment and Natural Resources:

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