DOWNLOAD PDF INTEGRATED WATER RESOURCES MANAGEMENT

Chapter 1 : What is IWRM? - GWP

Integrated Water Resources Management (IWRM). Water is a key driver of economic and social development while it also has a basic function in maintaining the integrity of the natural environment.

IWM can be practiced at many scales; the utility scale, the city scale, and the watershed scale are common examples. This focus has also framed the development of this resource center. The resources included here are organized into several categories, although many of them will fit into multiple categories. How Integrated Water Management Can Help Cities Thrive The paper is the result of a three-day convening of mayors, water utilities, and other leaders to discuss the integration of water management in their municipalities. It introduces the concept, why it is important, offers strategies, and proposes several next steps that municipalities can take to integrate water management in their neighborhoods. A Guide for Institutional Innovation Two resources that take a deep dive into the approaches which cities and organizations might take to advance IWM. Primarily based on a literature review of the major challenges encountered to date and examples of how organizations have taken Provides several in-depth case studies from United States and Australia. Read Moreâ€¦ Summarizes three national dialogues with leaders from multiple sectors across the country. The resulting principles include valuing water, sustaining water, monitoring water, innovation science, technology, and finance , integration, and collaboration. Read More â€¦ Guiding Principle: Communicate and Collaborate Communication and collaboration is at the heart of any form of integrated planning, and water management is no different. Rather than being a step in the process of IWM, this is the guiding principle which should be a part of every step. Breaking Down the Silos and Building a One Water Approach Offers a five-step process designed to 1 inspire municipalities to start a conversation about an integrated approach to water management, and 2 offer specific steps for organizing a workshop where that conversation can occur. The key focus of this paper is on how to break down silos in municipalities. A framework to help build leadership capacity Describes six leadership roles that often drive more sustainable forms of water management: The paper also highlights some of the key leader competencies and strategies associated with these roles, and helps to identify which roles an emerging water leader is most suited to, and provides a framework to help analyze how people in different leadership roles effectively work together. A New Vision for Water Management in the Los Angeles Region This report identifies barriers to building a unified watershed approach and recommends paths forward to a more nimble and responsive governance structure. Focus on California but has wide applicability. How Natural Water Infrastructure Can Save Money and Improve Lives Communities in the United States are being threatened by sewage overflows, flooding, polluted stormwater, leaky pipes, and at-risk water supplies. To solve this problem, we do not just need more investment in water infrastructure.

Chapter 2 : DEEP: Integrated Water Resource Management

Integrated water resources management (IWRM) has been defined by the Global Water Partnership (GWP) as "a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.

Integrated Water Resources Management Integrated Water Resources Management Integrated water resources management is the practice of making decisions and taking actions while considering multiple viewpoints of how water should be managed. These decisions and actions relate to situations such as river basin planning, organization of task forces , planning of new capital facilities, controlling reservoir releases, regulating floodplains , and developing new laws and regulations. The need for multiple viewpoints is caused by competition for water and by complex institutional constraints. The decision-making process is often lengthy and involves many participants. Components and Viewpoints Integrated water resources management begins with the term "water resources management" itself, which uses structural measures and nonstructural measures to control natural and human-made water resources systems for beneficial uses. Water-control facilities and environmental elements work together in water resources systems to achieve water management purposes. Integrated water resources management considers viewpoints of human groups, factors of the human environment, and aspects of natural water systems. Structural components used in human-made systems control water flow and quality and include conveyance systems channels, canals, and pipes , diversion structures, dams and storage facilities, treatment plants, pumping stations and hydroelectric plants, wells, and appurtenances. Elements of natural water resources systems include the atmosphere, watersheds drainage basins , stream channels, wetlands , floodplains, aquifers , lakes, estuaries , seas, and the ocean. Examples of nonstructural measures, which do not require constructed facilities, are pricing schedules, zoning, incentives, public relations, regulatory programs, and insurance. Integrated water resources management considers the viewpoints of water management agencies with specific purposes, governmental and stakeholder groups, geographic regions, and disciplines of knowledge see the figure. These viewpoints have been described in a variety of ways. For example, Mitchell wrote that integrated water management considers three aspects: White wrote about the "multiple purposes" and "multiple means" of water management, and predicted that integration would create some confusion because it defies neat administrative organization. In general, water agencies deal with water supply, wastewater and water quality services, stormwater and flood control, hydropower, navigation, recreation, and water for the environment, fish, and wildlife. As the practice of water resources management evolved, the term "multipurpose" or "multiobjective" water resources development or management came to refer to projects with more than one purpose. Later, the term "comprehensive" water planning and management came into use to describe management practice that considers different viewpoints. Challenges to Water Management Integration The term "functional integration" means to join purposes of water management such as to manage water supply and wastewater within a single unit. Protecting aquatic habitat for natural and ecological systems while managing for flood control is another example. Still another term is "conjunctive use," which usually refers to the joint management of surface water and groundwater. Governmental and Interest Groups. Accommodating the views of governments and special interest groups is a challenge in integration because they have different perspectives. Intergovernmental relationships between government agencies at the same level include regional, state-to-state, and interagency issues. Relationships between different levels of government include, for example, stateâ€”federal and localâ€”state interactions. Special interest groups range from those favoring development of resources to those favoring preservation. In many cases, conflicts arise between the same types of interest groups, as, for example, between fly fishers and rafters on a stream. The views of stakeholders in different locations must be balanced, introducing a geographic dimension of integration. Examples include issues between upstream and downstream stakeholders, issues among stakeholders in the same region, and views of stakeholders in a basin of origin versus those in a receiving basin. Another aspect of geographic integration is the scale of water-accounting

units, such as small watershed, major river basin, region, or state, even up to global scale. The complexity of integrated water resources management requires knowledge and wisdom from different areas of knowledge, or disciplines. Blending knowledge from engineering, law, finance, economics, politics, history, sociology, psychology, life science, mathematics, and other fields can bring valuable knowledge about the possibilities and consequences of decisions and actions. For example, engineering knowledge might focus on physical infrastructure systems, whereas sociology or psychology might focus on human impacts. Coordination and Cooperation Coordination is an important tool of integration because the arena of water management sometimes involves conflicting objectives. Coordinating mechanisms can be formal, such as intergovernmental agreements, or informal, such as local watershed groups meeting voluntarily. Cooperation is also a key element in integration, whether by formal or by informal means. Cooperation can be any form of working together to manage water, such as in cooperative water management actions on a regional scale, often known as "regionalization. Integrated water resources management can take different forms and is examined best in specific situations. In the water-supply field, the term "integrated resource planning" has come into use to express concepts of integration in supply development. Perhaps the most comprehensive concept for water supply is "Total Water Management. A basic principle of Total Water Management is that the supply is renewable, but limited, and should be managed on a sustainable-use basis. Taking into consideration local and regional variations, Total Water Management: Encourages planning and management on a natural water systems basis through a dynamic process that adapts to changing conditions; Balances competing uses of water through efficient allocation that addresses social values, cost effectiveness, and environmental benefits and costs; Requires the participation of all units of government and stakeholders in decision-making through a process of coordination and conflict resolution; Promotes water conservation, reuse, source protection, and supply development to enhance water quality and quantity; and Fosters public health, safety, and community goodwill. This definition focuses on the broad aspects of water supply. Examples can be given for other situations, including water-quality management planning, water allocation, and flood control. American Water Works Association, August Principles, Regulations, and Cases. International Experiences and Perspectives, ed. Strategies of American Water Management. University of Michigan Press, Engineering knowledge might focus on physical infrastructure systems, whereas sociology or psychology might focus on human impacts. The physical and life sciences help managers understand environmental issues, and the social sciences focus on policy issues of the past, present, and future. Mathematics and computer science offer new tools for analysis. The interdisciplinary approach enables managers to use many disciplines to identify promising alternatives for solving complex problems and to assess the full range of impacts on the natural and human environments. Johannes Buckle May 5, 1: IWRM is mind boggling to say he least. Most hangs in the air as lofty ideals with little tangible on the ground. I like the term Total Water Management or even better the one that we coined for the department I am leading in the water board - Human Water Cycle Management. I think we know by now what needs to be done but unfortunately we still want to debate the issues. My dilemma with IWRM is exactly what the author states - the term resources confuses. One cannot think of Water Demand Management or one of the cornerstones public participation if you talk resource. These two items plays off at the receiving end of the product - not in the resource. Cheers EVA Sep 5, 2: Management of water resource is not just a technical aspect.. I would be glad to get the related issues about interdisciplinary approach needed to be considered in water resourse management.

Chapter 3 : Water management, freshwater resources, integrated water resources management | WSP

Integrated Water Resource Management (IWRM), also known as One Water, is an approach to managing water that looks holistically at the planning and management of water supply, wastewater, and stormwater systems.

This approach is based on six key elements: We focus on how our waters are used, such as for drinking water, fishing, swimming and for supporting healthy wildlife and fish communities, as well as the water quality needed to support these activities. We find some waters which are not healthy and need some actions to bring back or restore good water quality. Other waters are healthy and have very good water quality, which needs to be maintained and protected. We establish plans and identify actions to achieve these restoration or protection goals and work with partners through voluntary and regulatory efforts to protect areas of good water quality and restore areas with poor water quality. Over time, we may adjust the areas selected for plan development as new information and opportunities occur, with input from the public. A TMDL can be thought of as a water pollution budget. The amount of the pollutant must be reduced to a lower level for the waterbody to be within its budget and water quality to be restored. Similarly, for waters with good water quality, setting a budget helps keep the amount of each pollutant at levels which protect existing water quality. The goal for all waterbodies is to be within their budgets, meet water quality standards and be suitable for all designated uses. Developing pollution budgets is not a new activity, but EPA and the States are trying to take a new approach to this effort. EPA and the States looked at the past practices used to develop these plans and found some changes which could be made to improve this effort. The updated approach is based on six key elements which EPA identifies as: It allows states to identify areas for plan development based on state-specific concerns and provides sufficient time to develop plans using flexible approaches within regulatory authority. Waters and Watersheds for Action Plan Development CT DEEP identified water quality focus areas based on known water quality concerns, previous reports and public comments which are highlighted below: This list of selected waters can be revised periodically every two years through the Integrated Water Quality Report process. Over time, additional waters will be identified for development of water quality restoration and protection plans. Next Steps A key first action for CT DEEP is analyzing existing data to determine if any additional data collection is needed in each selected watershed. This planning action will assist with targeted monitoring and more understanding of conditions within a watershed. CT DEEP will also be focusing on identifying potential sources which could impact water quality and evaluate pollutant loads in the selected waters. With sufficient information, CT DEEP will begin work on development of action plan documents for each of the selected waters. A group may be able to assist with data collection, potential source identification or other needs for action plan development. As action plans are developed, additional site specific public comment opportunities will exist to enhance the documents with local knowledge and input. For more information, please contact us at

Chapter 4 : Integrated Water Resource Management

Reid for their leadership in the field of integrated water resources management. Thanks to Kathy Bowman, Cheryl Ulrich, Michael E. Campana, Dick Engberg, and William Battaglin for assistance with editing and reviewing this report; Andrew Graham, Carol R. Collier, David Watt, Erik.

In reality, however, each of these issues are interconnected; subsidised water prices, for example, can lead to rising water demand which may reduce the quantity of water in the environment thereby leading to an increase in the concentration of pollutants and a decline in water quality. Due to the interrelated nature of water issues, the use of particular economic or policy instruments can create trade-offs. Purchasing water access rights to secure environmental flows, for example, may be a cost-effective method of increasing the amount of water in the environment, but reduced water extractions may also negatively impact small towns and communities dependent on irrigated agriculture. In order for water security to be managed effectively, the use of economic and policy instruments cannot be considered in isolation, but rather should be considered in terms of their wider impact on society and the environment. In order to deal with this complexity and coordinate policy effectively, it is often argued that economic and policy instruments should be used as part of a wider integrated water resource management IWRM framework. IWRM is a framework designed to improve the management of water resources based on four key principles adopted at the Dublin Conference on Water and the Rio de Janeiro Summit on Sustainable Development. These principles hold that: Chile, for instance, typically emphasises the importance of economic efficiency, whereas South Africa and the Netherlands tend to place more emphasis on social and environmental goals respectively. It should not, however, be thought that there are always trade-offs between these goals, and a more integrated approach to water security management can help in achieving win-win outcomes which promote more than one goal. Implementing a well-designed scheme for pricing water resources, for example, can promote economic efficiency, create environmental benefits due to decreases in water demand, and generate social benefits if the funds are used to expand service provision or are combined with subsidy schemes for low-income households. While the differences in implementation across countries can make IWRM difficult to define , it can be broadly characterised by a number of key trends. Firstly, there has tended to be a move away from command-and-control instruments which focus on supply-side water management, such as large-scale water infrastructure, towards incorporating demand side management though the use of economic instruments. This shift in focus has created a more flexible approach to water management and has encouraged the development of a variety of innovative instruments to resolve local water security problems. Secondly, IWRM has led to an increased awareness of the importance of sustainable development and the incorporation of social and environmental considerations into water management. Thirdly, IWRM has also tended to lead to a move away from top-down, centralised approaches to water security towards more flexible, decentralised approaches which involve a variety of diversified governance structures at a local, basin, national, and transnational level. Some of the benefits of wider collaboration include: Due to the complexity of water issues within and between countries, any policy framework with clearly defined and prescriptive solutions is likely to struggle to be applicable across all situations,2,3 and there is growing evidence that implementing IWRM can offer substantial, long-term benefits to water security and water management. Rapid population growth combined with industrial and agricultural development have lead to serious imbalances between water withdrawals and availability. Further, the increasing competition over water resources in the basin, combined with poor governance, has led to over-exploitation of surface and ground water resources, increasingly frequent conflicts over water allocations, and considerable levels of water pollution and soil degradation. The improvement in water governance is due to reforms beginning in the s which started a move away from centralised governance in Mexico towards IWRM. By the early s, six regional water resources offices were set up, including the newly created Lerma-Chapala River Basin Regional Management agency which was given the responsibility of gathering information and designing a Basin Plan. Further reforms in and strengthened the decentralisation process and set up Basin Councils with formal powers to implement the proposed water reallocation policies. The

Lerma-Chapala Basin Council carried out a hydrological study of the Basin and developed a model to evaluate the impact of various water reallocation policies according to economic, social, technical, political, and environmental criteria. This model was then used as a basis for water reform in the Basin. The Council also encouraged extensive collaboration with stakeholders in the Basin and took steps to communicate their work as transparently as possible which reduced the level of conflict over reallocations. While the move towards IWRM in the Lerma-Chapala Basin has been a long and difficult process, after 30 years, the benefits are starting to be realised. Such case studies highlight the fact that IWRM can lead to more economically, socially, and environmentally sustainable solutions to complex water issues, however, it is important to note that this will not always be the case. IWRM based schemes can be unsuccessful5 and critical evaluation of the successes and failures of such schemes is crucial to understanding how water management can be improved. As such, while people may want a set of prescriptive solutions to resolving water issues, in reality, complex issues require complex solutions and one of the main reasons for adopting IWRM may be that its flexibility embraces and accounts for the challenges of complexity. Please see the Global Water Forum terms and conditions here.

Chapter 5 : Integrated Water Resources Management | United Nations University â€“ Water Learning Cent

Integrated Water Resources Management (IWRM) has been defined by the Technical Committee of the Global Water Partnership (GWP) as "a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising.

UN Websites Integrated Water Resources Management IWRM Water is a key driver of economic and social development while it also has a basic function in maintaining the integrity of the natural environment. However water is only one of a number of vital natural resources and it is imperative that water issues are not considered in isolation. Managers, whether in the government or private sectors, have to make difficult decisions on water allocation. More and more they have to apportion diminishing supplies between ever-increasing demands. Drivers such as demographic and climatic changes further increase the stress on water resources. The traditional fragmented approach is no longer viable and a more holistic approach to water management is essential. Stages in IWRM planning and implementation There are great differences in water availability from region to region - from the extremes of deserts to tropical forests. In addition there is variability of supply through time as a result both of seasonal variation and inter-annual variation. All too often the magnitude of variability and the timing and duration of periods of high and low supply are not predictable; this equates to unreliability of the resource which poses great challenges to water managers in particular and to societies as a whole. Most developed countries have, in large measure, artificially overcome natural variability by supply-side infrastructure to assure reliable supply and reduce risks, albeit at high cost and often with negative impacts on the environment and sometimes on human health and livelihoods. Many less developed countries, and some developed countries, are now finding that supply-side solutions alone are not adequate to address the ever increasing demands from demographic, economic and climatic pressures; waste-water treatment, water recycling and demand management measures are being introduced to counter the challenges of inadequate supply. In addition to problems of water quantity there are also problems of water quality. Pollution of water sources is posing major problems for water users as well as for maintaining natural ecosystems. In many regions the availability of water in both quantity and quality is being severely affected by climate variability and climate change, with more or less precipitation in different regions and more extreme weather events. In many regions, too, demand is increasing as a result of population growth and other demographic changes in particular urbanization and agricultural and industrial expansion following changes in consumption and production patterns. As a result some regions are now in a perpetual state of demand outstripping supply and in many more regions that is the case at critical times of the year or in years of low water availability. IWRM is an empirical concept which was built up from the on-the-ground experience of practitioners. Although many parts of the concept have been around for several decades - in fact since the first global water conference in Mar del Plata in - it was not until after Agenda 21 and the World Summit on Sustainable Development in in Rio that the concept was made the object of extensive discussions as to what it means in practice. The report is structured in accordance with key IWRM principles and it describes the efforts to create institutional and legal frameworks and implement IWRM principles in these countries. Towards Integrated Water Resources Management. April This report looks at the development of River Basin Organisations RBOs in terms of availability of data, logical demarcation, adequate organisational design, clear mandates, stakeholder participation and transparent decision-making, integrated planning systems and capacity building amongst others. The report also provides guidance for establishing a regular international monitoring and reporting framework to promote sustainable development and management of water resources.

Chapter 6 : INTEGRATED WATER RESOURCES MANAGEMENT

Integrated Water Resources Management. Integrated water resources management is a set of systematic procedures that can contribute to the sustainable development, allocation, and monitoring of water resource use in the context of social, economic, and environmental objectives.

What Is Integrated Water Management? Water is an essential element in our lives, but population growth and climate change are forcing us to re-evaluate how we manage water resources to maintain sustainable access to clean water. Population growth, combined with increasingly severe droughts and floods, are straining our rivers and water supplies like never before. These extremes mean that communities need to manage and use water in a smarter , more economical way that benefits both communities and nature. Cities face tough water challenges In , the percentage of the U. Urban areas are facing a number of challenges when it comes to water, and grappling with questions including: How do we face a future with too much water, too little water, and water at the wrong time? How do we address heightened concerns over water quality and regulatory compliance that force difficult choices between water investments? How do our communities continue to develop and grow in population and have confidence that the water our communities and ecosystems need will be there? How do we sustain our source waters â€" our rivers â€" that are often shared beyond political and water management boundaries? Solutions for people and rivers The solution to our water challenges lies in successfully managing water as a single resource and adopting proven technology, tools and policies that promote the natural water cycle. Integrating the management of water in all its forms â€" drinking water, stormwater , wastewater and source waterâ€" is the only way to solve our current and future water challenges. These solutions are helping cities minimize their impact on rivers and the natural environment, maximize their contribution to social and economic vitality, and improve overall quality of life. Integrated water management considers the urban water cycle as a single integrated system, in which all urban water flows are recognized as potential resources. Integrated water management is practiced through inclusive and jointly planned management of all water systemsâ€" where all waters are resources and are valued and put to use. What does this look like? Waste water is recycled to become drinking water. Stormwater is allowed to soak into the ground, supporting healthy river flows that provide drinking water and assimilate waste. Drinking water supplies are optimized through efficiency and conservation leaving more water in the river. How does it work? Collaboration is critical as some tasks cannot be accomplished by one organization or one sector. For example, green stormwater infrastructure means rethinking how we design our cities and communities. This requires stormwater utilities, transportation engineers, urban planners, city government, architects, neighborhood advocates, and many others to work together. How does integrated water management help rivers? Healthy rivers depend on enough clean water. Healthy rivers require flows, water quality, connectivity, and habitat and are directly and indirectly affected by how we manage water resources. Integrated Water Management presents opportunities for environmental benefits to be compared and achieved alongside social and economic benefits. This approach avoids the false choice of working for the economy or environment or society â€" and recognizes the critical importance of sustaining the resource â€" the river â€" for the good of all.

Chapter 7 : Integrated Water Resources Management | Courses | Galilee Institute

Integrated Water Resources Management (IWRM) is a coordinated, goal-directed 'process which promotes the coordinated development and management of water, land and related resources in order to maximize economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems and the environment'.

Development[edit] The development of IWRM was particularly recommended in the final statement of the ministers at the International Conference on Water and the Environment in so called the Dublin principles. This concept aims to promote changes in practices which are considered fundamental to improved water resource management. In the current definition, IWRM rests upon three principles that together act as the overall framework: IWRM practices depend on context; at the operational level, the challenge is to translate the agreed principles into concrete action. Implementation[edit] Operationally, IWRM approaches involve applying knowledge from various disciplines as well as the insights from diverse stakeholders to devise and implement efficient, equitable and sustainable solutions to water and development problems. As such, IWRM is a comprehensive, participatory planning and implementation tool for managing and developing water resources in a way that balances social and economic needs, and that ensures the protection of ecosystems for future generations. An IWRM approach is consequently cross-sectoral, aiming to be an open, flexible process, and bringing all stakeholders to the table to set policy and make sound, balanced decisions in response to specific water challenges faced. An IWRM approach focuses on three basics and aims at avoiding a fragmented approach of water resources management by considering the following aspects: A proper enabling environment is essential to both ensure the rights and assets of all stakeholders individuals as well as public and private sector organizations and companies , and also to protect public assets such as intrinsic environmental values. Institutional development is critical to the formulation and implementation of IWRM policies and programmes. Failure to match responsibilities, authority and capacities for action are all major sources of difficulty with implementing IWRM. The management instruments for IWRM are the tools and methods that enable and help decision-makers to make rational and informed choices between alternative actions. Some of the cross-cutting conditions that are also important to consider when implementing IWRM are: Political will and commitment Adequate investment, financial stability and sustainable cost recovery Monitoring and evaluation IWRM should be viewed as a process rather than a one-shot approach - one that is long-term and iterative rather than linear in nature. As a process which seeks to shift water development and management systems from their currently unsustainable forms, IWRM has no fixed beginnings or endings. Furthermore, there is not one correct administrative model. The art of IWRM lies in selecting, adjusting and applying the right mix of these tools for a given situation. References[edit] Rahaman, M. Integrated water resources management: Integrated Water Resources Management: International Journal of Water Resources Development, 20 4: Why, What and How?

Chapter 8 : Integrated Water Resources Management | UNDP

Resources to frame American Rivers' approach to the philosophy of integrated water management (IWM) What Is Integrated Water Management The solution to our water challenges lies in successfully managing water as a single resource and adopting proven technology, tools and policies that promote the natural water cycle.

Chapter 9 : Integrated Water Management Resource Center | American Rivers

Through Integrated Water Resource Management, CT DEEP has identified areas for development of Action Plans through Over time, we may adjust the areas selected for plan development as new information and opportunities occur, with input from the public.