

Resource Material in a Nutshell

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This compendium provides readings on contentious issues related to water and economics in South Asia. It deals with problematic issues of water management when analysed through economic lens. Water economics includes various laws, institutions and policies that allocate, distribute and regulate use of water resources. The collection of literature available in this compendium begins by discussing the need and importance of studying “economic conception of water” and then sets out to a wide range of issues such as institutional economics, valuation and pricing of water systems, the contested issue of privatization of water, economics associated with floods, pollution, ground water, and community managed irrigation, participatory irrigation and water reforms.

Theme 1: Introduction to Water and Economics

1.1 The Economic Conception of Water

How does one understand the relationship between water and economics? To inform such diagnosis, this article reviews two core issues of economic conception of water. It first explains the economic concept of value, how it is measured and applied in water in many ways. Then the paper engages into the debate whether water should be considered as an economic commodity or not. The author states that there are some “distinctive emotive” and “symbolic” economic features that make demand and supply of water different when compared to other goods.

Reference: Hanemann, W. M.2005. 'The Economic Conception of Water', Working Paper no. 1005, pp.1-30. Department of Agricultural and Resource Economics and Policy. Division of Agriculture and Natural Resource, University of California at Berkeley. Available online at <http://are.berkeley.edu/~hanemann/Economic%20conception%20of%20water.pdf> (accessed in September 2011).

1.2 Water as an Economic Good and Demand Management Paradigms with Pitfalls

What is the purpose of water pricing? Does economic pricing of water ensure to reach a level where there is a desirable demand management? The authors of this paper argue that pricing of water usage should primarily serve for the financial sustainability of the system through the means of cost recovery. They state that there is need for a defining the reasonable price for water usage which takes into consideration the equity issues, ensures full cost recovery, safeguards ecological requirements. Though cost recovery remains the primary motive of water pricing it also gives a signal to the people that water should be used judiciously and wisely. The paper concludes by stating that various water using sectors require different reliabilities of supply that needs to be reflected in price of water.

Reference: Savenije, Hubert and Pieter van der Zaag. 2002. 'Water as an Economic Good and Demand Management Paradigms with Pitfalls', *Water International*, Vol. 27, No. 1, pp. 98–104. Available online on http://webworld.unesco.org/Water/wwap/pccp/cd/pdf/educational_tools/course_modules/reference_documents/water/waterasaneconomicgood.pdf (accessed in November 2011).

1.3 Why Water is Not An Ordinary Economic Good, or Why the Girl is Special

Considering water as just another economic good and designating an appropriate price to water is a contentious issue. The author of this article using the metaphor about the girl refers to the fact that people generally consider their daughter to be special and not just as a girl. The paper gives an overview of why water is not considered as just another economic good which is the stand taken by water professionals. This group of people state that that the combination of different characteristics of water leads to giving special treatment to the resource. On the contrary economists state that those aspects that make water complex and special form other economic goods can be dealt with and they therefore give logical explanation to the each characteristic. However they do agree with the fact there are many complication that makes water very special.

Reference: Savenije, Hubert H.G.2002. 'Why Water is Not An Ordinary Economic Good, or Why the Girl is Special', *Physics and Chemistry of the Earth*, Vol. 27, No. 11-22, pp. 741-744. Available online at http://webworld.unesco.org/Water/wwap/pccp/cd/pdf/educational_tools/course_modules/reference_documents/water/waterisnotanordinaryeconomicgood.pdf (accessed in November 2011).

Theme 2: Institutional Economics and Property Rights of Water

2.1 The Institutional Economics of Water a Cross-Country Analysis of Institutions and Performance

This book is based on an exhaustive study on the recent institutional changes in the global water sector in a comparative context. It evaluates the process (es) of interaction between institutions performance from a cross- country perspective. The author of the book has attempted to study the nature and direction of institutional change, the factors that motivate these changes and how far these changes are adequate to address the existing as well as emerging water sector challenges.

Reference: Saleth, R. Maria and Ariel Dinar.2004. *The Institutional Economics of Water: A Cross-Country Analysis of Institutions and Performance*. Cheltenham and Northampton: Edward Elgar Publishing Limited. Available online at http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2004/10/19/000160016_20041019170821/Rendered/PDF/302620PAPER0In110economics0of0water.pdf (accessed in September 2011).

2.2 The New Institutional Economics of India's Water Policy

What all is covered in the institutional analysis of water sector? Laws, policies and organizations are considered central theme by many water analysts. With changes in the demands the policies also change therefore there is need to study about “people”, “exchange institutions”, “civil society institutions”, “religions and social movements”. The author of the paper makes three broad propositions a) water institutions of a country depend on the level of formalization of water economies , which in turn is considers the proportion of economy that comes under regulatory ambit b) in primitive society, water sector is informal and they become more formal as the economies grow c)the pace of the formalization process is dependent on host of factors such as population pressure on water and land resources, macroeconomic policies, nature of the state and many others. The author concludes by stating that the contemporary water economy of India is informal. The institutional environment must improve the performance by enhancing reforms in the institutional arrangements. However such reforms have pursued lower pay offs or has involved high transaction cost or both. Also large scale institutional changes that have enhanced welfare and reduced the transaction costs have been overlooked.

Reference: Shah, Tushaar. 2005. 'The New Institutional Economics of India's Water Policy', Paper prepared for International workshop on 'African Water Laws: Plural Legislative Frameworks for Rural Water Management in Africa, 26-28 January 2005, Johannesburg, South Africa. Available online at <http://www.nri.org/projects/waterlaw/AWLworkshop/SHAH-T.pdf> (accessed in September 2011).

2.3 Determinants of Institutional Success for Water in India: Results from a Study across Three States

Institutional organizations and management are often neglected in discussion about water resources management in a given socio-economic and political setting. The authors of the paper take a close look at these aspects by elaborating on the issues of emerging institutional problems in the water sector. For the purpose of analyzing the myriad institutional challenges the authors draw examples from the states Gujarat, Maharashtra and Andhra Pradesh where the problem of water scarcity is prevalent. The paper uses the new institutional economics framework and theories of good governance emerging from management sciences to examine the nature of functioning of the local institutions.

Reference: Gandhi, Vasant, Lin Crase and Gamini Herath.2007. 'Determinants of Institutional Success for Water in India: Results from a Study across Three States', Paper Prepared for the 51st Annual Conference of the Australian Agricultural and Resource Economics Society (AARES), February 13-16, 2007, Queenstown, New Zealand. Available online at <http://ageconsearch.umn.edu/bitstream/10372/1/cp07ga01.pdf> (accessed in September 2011).

2.4 Water Rights System as a Demand Management Option: Potentials, Constraints and Prospects

This paper discusses the “potentials”, “problems” and “prospects” of water rights system in managing irrigation demand. The paper first reviews different conceptual perspectives on water rights, following which it illustrates examples of various forms of water rights that have existed in India. The next part of the paper briefly examines the rationale for the introduction of property rights structure in surface and ground water irrigation. This section is followed by a brief discussion of the international experience with property rights structure and its efficacy as a tool for demand management. The last two sections of the paper gives an overview of the hydrological, technological and institutional conditions that enable smooth functioning of the water rights systems and examines the contexts on which such system might be feasible in the Indian context.

Reference: Narain, Vishal. 2009. 'Water Rights System as a Demand Management Option: Potentials, Constraints and Prospects', in Rathinasamy Maria Saleth (ed), *Strategic Analyses of the National River Linking Project (NRLP) of India Series 3: Promoting Irrigation Demand Management in India: Potentials, Problems and Prospects*, pp. 127-145. Colombo: International Water Management Institute. Available online at <http://www.iwmi.cgiar.org/Publications/Other/PDF/NRLP%20Proceeding-3%20Paper%20-%206.pdf> (accessed in September 2011).

Theme 3: Valuation and Pricing of Water Systems

3.1 The Economic Value of the Environment: Cases from South Asia Willingness to Pay for Water in Dhaka Slums a Contingent Valuation Study

Providing safe drinking water to people is becoming a challenging task for the state in the present times. Majority of the population in developing countries remain un-served under the current delivery system. Under pricing of water supplied remains one of major reasons for this problem. The paper uses contingent valuation method to estimate willingness to pay for getting safe drinking water in the slums of Dhaka. The purpose of the paper is to a) to show how slum dwellers are willing to incur the cost of providing water to them and b) to show how contingent valuation is an effective tool for estimating willingness to pay for other public services.

Reference: Chowdhury, Nasima Tanveer .1999. 'The Economic Value of the Environment: Cases from South Asia Willingness to Pay for Water in Dhaka Slums a Contingent Valuation Study', in Joy E. Hecht (ed), *The Economic Value of the Environment: Cases from South Asia*. Gland: International Union for Conservation of Nature. Available online at <http://www.joyhecht.net/professional/papers/SAsia.valuation.ch4.pdf> (accessed in September 2011).

3.2 Municipal Water Pricing and Tariff Design: A Reform Agenda for South Asia

Pricing of water services has remained as one of the heated debates in the management of water. The service providers are unable to recover their financial costs leading to heavy losses. Assigning economic value to water has led to classifying water as a commodity. The author of the paper presents a set of arguments that discusses about major elements of water pricing and tariff reforms that are needed in many of the South Asian cities. The recommended reforms largely aim at the following: a) ensuring that all the services are metered, which enables implementation of pricing policies easy, b) changing the ways through which water bills are calculated for domestic and commercial purposes and c) making pro-poor policies during implementation of reforms.

Reference: Whittington, D. 2003. 'Municipal Water Pricing and Tariff Design: A Reform Agenda for South Asia', *Water Policy*, Vol.5, No.1, pp.61-76. Available online at http://www.sswm.info/sites/default/files/reference_attachments/WHITTINGTON%202003%20Municipal%20Water%20Pricing%20South%20Asia_0.pdf (accessed in September 2011).

3.3 Water Tariffs and Subsidies in South Asia: Tariff Structures in Six South Asian Cities

A host of water reforms are underway in many of the South Asian cities. These reforms largely aim to provide better services to the people in terms of better quantity and quality with a reasonable price. However water pricing affects the distribution of benefits among different water users in different ways. This paper states that pricing and subsidies are major sources of inefficiencies in the sector. The paper presents the basics of water tariff and subsidy issues by studying the tariff system in selected cities of the developing countries. The author states that the reform package provides an opportunity to rationalize and reconsider the tariff and subsidy structures that may provide better chances of improving the problems of inefficiency, inequity and problems of access to water.

Reference: Brocklehurst, Clarrisa. 2002. 'Water Tariffs and Subsidies in South Asia: Tariff Structures in Six South Asian Cities', Paper Series 3, prepared as part of the capacity building initiatives undertaken by the South Asia Energy and Infrastructure of the World Bank Institute and the Water and Sanitation Program (WSP). Washington DC: Public-Private Infrastructure Advisory Facility and WSP. Available online at http://www.wsp.org/wsp/sites/wsp.org/files/publications/418200752957_scorecard.pdf (accessed in September 2011).

3.4 Issues of Pricing Urban Water

How are the growing demands for water supply met under a rapidly urbanizing scenario? How are the problems of intermittent water supply getting addressed? Many urban water supply authorities respond to such circumstances by

tapping water from a distant resource, which is often expensive compared to the earlier delivery system. However this solution is not sustainable in the long run. The paper by highlighting the importance of water pricing focuses on the issues that are crucial in determining appropriate pricing system and the need to initiate reforms. The paper concludes by stating that the local urban bodies could financially survive only by initiating reforms in the water sector that focus on bringing down the cost of water supply.

Reference: Padwal, Rajan. n.d. 'Issues of Pricing Urban Water', Working Paper 13, pp. 1-22. Available online at http://www.mu.ac.in/arts/social_science/eco/pdfs/vibhuti/wp13.PDF (accessed in September 2011).

3.5 The New Economy of Water: The Risks and Benefits of Globalization and Privatization of Fresh Water

International development agencies are spreading new ideas of effective and efficient water service delivery through new ways of pricing water. Transfer of water across oceans, bottled water, delegating the responsibility of operation and management of water supply systems are some of the prominent forms of private sector participation in water sector. The development agencies have encouraged and are promoting market approach to water sector by bringing in series of new policies and also providing financial support in the form of loans to countries. This paper addresses such issues and also offers principles and standards that guide the policy makers. The authors state that any effort to privatize or commodify water must be carefully evaluated. Any privatization endeavour must ensure that they respect and support certain social objectives such as provide basic needs of water to people and ecosystem, enable equitable access to water for all sections of the society and ensure water use efficiency and productivity.

Reference: Gleick, Peter H., Gary Wolff, Elizabeth L. Chalecki, Rachel Reyes. 2002. 'The New Economy of Water: The Risks and Benefits of Globalization and Privatization of Fresh Water', Report by the Pacific Institute for Studies in Development, Environment, and Security. Oakland: Pacific Institute for Studies in Development, Environment, and Security. Available online at http://www.pacinst.org/reports/new_economy_of_water/new_economy_of_water.pdf (accessed in September 2011).

Theme 4: Privatization of Water

4.1 Water Privatization in the Asia Pacific Region

“Water Privatization in the Asia Pacific Region” describes the accelerated pace of water privatization in the Asia Pacific region, primarily led by International Financial Institutions, enforcing this practice on governments in the global south. Privatization of water has some major disadvantages; for one it severely erodes people's access, particularly the section that cannot afford it. Contrary to the claims made by proponents of privatization, the overall impact of a private player handling control, distribution and management does not always ensure transparency and quality. Also the overemphasis on profitability has led to considerable deterioration of services. The paper chooses to elaborate on a case study from Philippines, of the Maynilad Water Services Inc, which led to water contamination and illness, and even death in the case of six people. The paper chooses to elaborate on a case study from Philippines, of the Maynilad Water Services Inc, which led to water contamination and illness, and even death in the case of six people. The International Financial Institutions like the IMF and World Bank are proponents of water privatization. Their modus operandi includes using the debt claimed from South countries as leverage to push the privatization of water services. Privatization policies are imposed through lending criteria, as these institutions provide loans to government projects to create conditions and fulfill requirements for the entry of private corporations.

Reference: JS-APMDD (Jubilee South- Asia Pacific Movement on Debt and Development). n.d. *Water Privatization in the Asia Pacific Region*. JS-APMDD. Available online at http://www.jubileesouth.org/upload1/water_lo.pdf (accessed in October 2011).

4.2 Water: Private, Limited: Issues in Privatization, Corporatisation and Commercialisation of Water Sector in India

Recent years have brought new evidence of increased participation of private players in water sector in the developing countries. Though water privatisation is one of the most controversial topics among academicians and policy makers, it has continued to evolve under different names and motives. What are those motives? How different are the new models of private sector participation compared to the earlier ones? This booklet gives an overview of the water privatisation in India- the actors involved in the process and the nature of the participation of private players. Drawing information from myriad sources and interpreted by the authors in the context of the economy specifically in water sector, the booklet sheds light on key trends and implications on water privatization.

Reference: Dwivedi, Gaurav, Rehmat and Shripad Dharmadhikary. 2007. *Water: Private, Limited: Issues in Privatization, Corporatisation and Commercialisation of Water Sector in India*. Bhopal: Aadarsh Printers & Publishers. Available online at http://www.manthan-india.org/IMG/pdf/Water_Pvt_Ltd_New.pdf (accessed in October 2011).

4.3 24/7, 'Privatisation' and Water Reform: Insights from Hubli-Dharwad

The concept of twenty four water supply has gradually been disappearing from the Indian water delivery system. A host of initiatives are undertaken by government in partnership with other non state actors and through financial aid from international financial organization to address this problem. This article studies one such process that is underway in one of the mid size towns of north Karnataka that aims at providing water round o'clock. It specifically throws light on the need and feasibility of twenty four hour water supply, the new institutional relationship that has emerged with the new partnerships in water services and the equity aspect of the new delivery mechanism.

Reference: Sangameswaran, Priya, Roopa Madhav and Clifton D'Rozario. 2008. '24/7, 'Privatisation' and Water Reform: Insights from Hubli-Dharwad', *Economic and Political Weekly*, pp.60-67. Available online at <http://www.ielrc.org/content/a0801.pdf> (accessed in October 2011).

4.4 Transforming Water Supply Regimes in India: Do Public-Private Partnerships Have a Role to Play?

The inability of government bodies to supply water to all has enabled the entry of private sector in water service delivery. However the role of private players is limited in India as it is in its nascent stage. Public Private Partnership has emerged as an innovative approach to expand the water distribution system. This article sheds light on the dynamics of such partnership, the role of players in transforming the existing infrastructure regime. Drawing examples from three cities of India the article develops the concept of water supply regime to describe water provision. The author concludes by stating that the new models are products of "regime-context" they are inserted within.

Reference: Gopakumar, Govind. 2010. 'Transforming Water Supply Regimes in India: Do Public-Private Partnerships Have a Role to Play?' , *Water Alternatives*, Vol.3, No.3, pp. 492- 511. Available online at http://www.water-alternatives.org/index.php?option=com_content&task=view&id=143&Itemid=1 (accessed in October 2011).

Theme 5: Economics Associated with Floods

5.1 Economic Aspects of Integrated Flood Management

Management of floods includes: scientific knowledge to understand and map out the vulnerability, an effective warning system and the finance required for protecting vulnerable areas and also for post disaster related rehabilitation programs. This document spells out approaches that help address socially relevant and environmental friendly economic analysis that might be especially useful for flood managers. The document further argues in favour of a context specific practices that suit the hydro-climatic, topographical and socio-economic setting of a place. It also sheds light on the importance of involvement of various stakeholders in the decision making process to help achieve these objectives.

Reference: Associated Programme on Flood Management (APFM). 2005. 'Economic Aspects of Integrated Flood Management', APFM, Technical Document No.5. Geneva: World Meteorological Organization. Available online at http://www.apfm.info/pdf/ifm_economic_aspects.pdf (accessed in September 2011).

5.2 Socio-Economic Impacts of Floods and Flood Protection: A Bangladesh Case Study

Devastating floods often drown Bangladesh. The severe negative impacts of floods in the year 1988 have led to increased investment in flood protection embankments. In this paper the author states that a case study in flood prone and flood protected areas losses incurred by poor households remain severe. Though there can be reduction in the "depth and duration" of the floods the benefits emerging from flood protection projects are "unevenly" distributed.

Reference: Thompson, Paul and Edmund C. Penning-Rowsell. 1991. 'Socio-Economic Impacts of Floods and Flood Protection: A Bangladesh Case Study', Paper prepared for the conference of the Developing Areas Research Group of the Institute of British Geographers and the Royal Geographical Society held in Enfield, United Kingdom on May 3. Available online at <http://www.eird.org/estrategias/pdf/eng/doc13380/doc13380-a.pdf> (accessed in November 2011).

5.3 Economic Impact of Climate Change on Mumbai, India

The purpose of this paper is to describe the impacts of climate change in Mumbai that include changes in weather conditions and brings variation in rainfall and flood and their consequent effect on health. The increase in sea level also results in loss of property especially areas near the coastline. The article gives a detailed description of such losses incurred and also offers a possible way forward to deal with such problems.

Reference: Kumar, Rakesh, Parag Jawale and Shalini Tandon. 2008. 'Economic Impact of Climate Change on Mumbai, India', *Regional Health Forum*, Vol. 12, No.1, pp. 38-42. Available online at http://www.searo.who.int/LinkFiles/Regional_Health_Forum_Volume_12_No_1_Economic_impact_of.pdf (accessed in November 2011).

Theme 6: Economics Associated with Pollution

6.1 Water Quality in Developing Countries, South Asia, South Africa, Water Quality Management and Activities that Cause Water Pollution

This article presents the impact of pollution on the quality of water. It is been observed that contamination of water is a universal problem thus ensuring good quality water has been one of the top most environmental priority. The author states that sustainable management of water quality has policy, technical, institutional and financial components therefore these aspects should be included in national water policies. The paper concludes by stating that there exists high level of variability in water quality in different South Asian and South African countries, there is a need for new technology for collection of data and application of knowledge based approach to environmental problems in data poor countries, there is a need for institutional change that ensures reduction of costs, need for protection of ground and surface water, improve the ways through which data is collected, engage in capacity building activities that enables the professionals to build their own system of water quality remediation and invest more on water quality programs in developing countries.

Reference: Abbaspour, Somaya. 2011. 'Water Quality in Developing Countries, South Asia, South Africa, Water Quality Management and Activities that Cause Water Pollution', *International Journal of Modeling and Optimization*, Vol. 15, pp. 94-102. Available online at <http://www.ipcbee.com/vol15/17-U10016.pdf> (accessed in November 2011).

6.2 Economic Instruments

Pollution of water resources poses serious health hazards of the people. The principle of polluter pays, which is central to environmental economics, is adopted by many countries. The introduction of the principle has made the polluter and the user to pay for the pollution caused. Theoretically this principle also leads to innovation of pollution control technology. This paper reviews the commonly used economic instruments that control water pollution. It suggests the criteria for selecting the most appropriate instruments and discusses the application of those instruments in developing countries and transitional economies. The paper concludes by stating that cost-effectiveness and administrative capacity are important criteria's for selecting the economic instruments. In addition to application of the instruments investments should be made on waste water treatment facilities, appropriate regulatory instruments as well as programmes that aim at persuading water users to change their polluting behaviour.

Reference: Bernstein, J.D. 1997. 'Economic Instruments' in Richard Helmer and Ivanildo Hespanhol (ed), *Water Pollution Control - A Guide to the Use of Water Quality Management Principles*. Available online at http://www.who.int/water_sanitation_health/resourcesquality/wpcbegin.pdf (accessed in September 2011).

6.3 The Costs of Water Pollution in India

The discharge of industrial effluents, municipal sewage, agricultural and bio medical waste into any kind of water resource has raised concerns about environmental pollution. The cost of calculating cost of water pollution is complex as it involves different cost for different types of pollution. This report deals with calculation of the cost of water pollution in the Indian context. It first presents the background of Indian regulation regarding water pollution and then list out the details of the pollution status of surface and ground water. Following which the document gives an overview of the studies that attempts to cost the water pollution and the last section of the report deals with the available figures available on major costs of pollution.

Reference: Maria, Augustin. 2003. 'The Costs of Water Pollution in India', Paper prepared for the conference on

Market Development of Water & Waste Technologies through Environmental Economics, 30-31 October 2003, Delhi, India. Available online at http://www.cerna.ensmp.fr/Documents/cerna_globalisation/maria-delhi.pdf (accessed in September 2011).

Theme 7: Economics of Community Managed Irrigation, Participatory Irrigation and Water Policy Reforms

7.1 Managing Water Resources: Communities & Markets

This article states that for an effective and sustainable management of common resources, the resources must be under the control of people and the state should limit its role to policy and legal framework. The genuine participation of people along with a change in the legal ownership would address the anomalies of state controlled management. The article gives brief description of some programs whereby responsibilities of management of irrigation and related service were transferred to local organisations of farmers.

Reference: Centre for Civil Society. 2003. 'Managing Water Resources: Communities & Markets', Briefing Paper by the Centre for Civil Society (CSS). New Delhi: CSS. Available online at http://www.ccsindia.org/ccsindia/pdf/water_brief.pdf (accessed in September 2011).

7.2 Developing a Method for Analyzing Institutional Change

How are the rules for managing common property resources framed by resource users? How do the users do this? What are the processes that produce positive outcomes? The author of this paper examines these issues by analyzing the processes in the context of irrigation institution. The paper in the first section gives an overview of the research findings of irrigation system. Following this it gives an overview of Institutional Analysis and Development. The third section of the paper engages with the possibility of looking at the change of rules as evolutionary process. The fourth section deals with the new methods of studying the evolution of new rules. The author concludes by raising the question of why is it important to authorize the resource user's autonomy in the development of their own rules.

Reference: Ostrom, Elinor. 2007. 'Developing a Method for Analyzing Institutional Change', Paper prepared for the workshop in Political Theory and Policy Analysis, Indiana University Centre for the Study of Institutional Diversity, Arizona State University. Available online at http://www.indiana.edu/~workshop/publications/materials/docs/W05_29_Ostrom.pdf (accessed in September 2011).

7.3 Pricing Irrigation Water: A Review of Theory and Practice

Water for irrigation purpose is increasing due to increasing food demands. The investments required for infrastructure development are huge, however the policy makers use different mechanism to allocate price for water distributed. The means through which appropriate price is levied for irrigation purpose has opened a wide arena of discussion on this issue. The authors of the paper state that even if private markets are allowed to allocate water meant for irrigation, the government has to provide stable and appropriate institutions that enable successful operation of the markets. This document reviews the issue of water allocation efficiency and equity in irrigation. Drawing inference from the vast literature available on irrigation the paper first looks into the theory and practice of water allocation policies in terms of efficiency and equity followed by a discussion on evolving water institutions and the political economy of water allocation.

Reference: Johansson, Robert C., Yacov Tsur, Terry L. Roe, Rachid Doukkali and Ariel Dinar. 2002. 'Pricing Irrigation Water: A Review of Theory and Practice', *Water Policy*, Vol. 4, No. 2, pp.173-199. Available online at <http://ddr.nal.usda.gov/bitstream/10113/46346/1/IND44427380.pdf> (accessed in September 2011).

7.4 Breaking the Gridlock in Water Reforms through Water Markets: International Experience and Implementation Issues for India

How to use water efficiently? Advocating reforms is the standard approach to use water efficiently. The concept of "willingness to pay" highlights the desirability of reforms. Therefore one of the suggested ways to achieve efficient allocation of water and reallocate water is through water markets. This paper discusses about the role of water markets by first elaborating on the concept of water markets and its rationale and also provides a review of international experience with water markets. It is followed by a discussion on the patterns through which formal water markets are

introduced in India. The authors then examine the legal and institutional problems in implementing formal water markets in India. The paper concludes by stating that the Indian water market has been positive with limited gains. The current challenge is to establish formal water markets that will expand the scope of trading and make inter-sectoral water transfers possible.

Reference: Mohanty, Nirmal and Shreekanth Gupta. n.d. 'Breaking the Gridlock in Water Reforms through Water Markets: International Experience and Implementation Issues for India', Working Paper Series. Available online at http://www.libertyindia.org/policy_reports/water_markets_2002.pdf (accessed in September 2011).

7.5 Political Economy and Political Risks of Institutional Reforms in the Water Sector

By providing insights to the interrelationship between the institutional arrangement, power structure and policy outcome this paper discusses about estimating political risks associated with implementation of institutional reforms in the water sector. The analytical approach of the paper consists of two-tier tool- first tier is a structured analysis of the power distribution among the groups interested in outcome of reforms and the second tier is based on expert's opinion. Further the paper also describes the risk mitigating strategies that are to be followed in dealing with various institutional interest groups involved in the project. The following approach was applied to the case of National Drainage Program Project in Pakistan.

Reference: Dinar, Ariel, Trichur K. Balakrishnan, and Joseph Wambia. n.d. 'Political Economy and Political Risks of Institutional Reforms in the Water Sector'. Available online at <http://www.bvsde.paho.org/bvsarg/i/fulltext/political/political.pdf> (accessed in September 2011).

Theme 8: Economics of Ground Water in South Asia

8.1 India's Ground Water Irrigation Economy: The Challenge of Balancing Livelihoods and Environment

Often malfunctioning of organizations associated with water resources are identified as main reasons for poor management of water resources. Progress has been made in technical and physical aspects of managing the resource however more needs to be done develop the institutions governing the water. This paper addresses the knowledge gap surrounding water institutions in India. Using the New Institutional Economics (NIE) framework and theories of good governance from the management sciences, the paper examines the nature and performance of local water institutions. The author states that the suggestions provided by NIE are determining institutional performance of the water institutions.

Reference: Shah, Tushaar. n.d. 'India's Ground Water Irrigation Economy: The Challenge of Balancing Livelihoods and Environment', Available online at <http://cgwb.gov.in/documents/papers/incidpapers/Paper%203-%20Tushaar%20Shah.pdf> (accessed in September 2011).

8.2 Economic Instruments for Groundwater Management Using Incentives to Improve Sustainability

Scarcity of a resource, its utilization and protection are the driving factors for assigning economic value to it. This helps in decision making process and also promotes efficient use of the resource. This document gives an overview of range of issues surrounding application of economic instruments for the management of ground water. The complexity of assessing ground water, the decentralized use of the resource, the invisible nature of ground water are some of the core issues that make management of ground water different from surface water. The note discusses about the following issues: what does economic value of groundwater mean and how is it determined, what are the economic instruments and how can they be used to improve the ground water management, the steps needed to introduce economic instruments for groundwater management and the economic instruments that are available to aid groundwater pollution control.

Reference: Kemper, Karin, Stephen Foster, Héctor Garduño Marcella Nanni Albert Tuinhof. n.d. 'Economic Instruments for Groundwater Management Using Incentives to Improve Sustainability', Brief Note series by the World Bank. Washington D.C.: World Bank. Available online at http://www.limpoporak.com/_system/DMSStorage/3471en/GWMATEBN07.pdf (accessed in September 2011).

8.3 Groundwater Markets in Pakistan: Participation and Productivity

How do water markets operate? Who participates in such transactions and what is the nature of such transactions? What is its impact on agricultural productivity and incomes? This report reviews these issues by examining the functioning of

water markets in Pakistan where agriculture is largely dependent on irrigation and ground water for its production. It discusses about the performance of the institutions, policy options for the government to improve equity of access to ground water.

Reference: Meinzen-Dick, Ruth. 1996. 'Groundwater Markets in Pakistan: Participation and Productivity', Research Report 105 by the International Food Policy Research Institute (IFPRI). Washington D.C.: IFPRI. Available online at http://pdf.usaid.gov/pdf/IFPRI_docs/PNABZ947.pdf (accessed in September 2011).

8.4 Economics of Ground Water Irrigation in Nepal: Some Farm-Level Evidences

Drawing from empirical data collected from 324 households in Nepal, this article examines the economics of groundwater irrigation and decision making processes related to shallow tube well ownership. It first lays down a description of production system and the characteristics of shallow tube well in Nepal. This is followed by the factors that condition ownership of the tube wells using econometric tools. The final section of the article discusses about the implications of expansion of ground water use in the country.

Reference: Bhandari, Humnath and Sushil Pandey. 2006. 'Economics of Ground Water Irrigation in Nepal: Some Farm-Level Evidences,' *Journal of Agricultural and Applied Economics*, Vol. 38, No.1, pp. 185-199. Available online at <http://ageconsearch.umn.edu/bitstream/43759/2/185.pdf> (accessed in September 2011).