DEW Point
DEVELOPMENT RESOURCE CENTRE
ENVIRONMENT – WATER – SANITATION

DFID Department for International Development

Climate references

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Final Report

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1. Description of enquiry

I am looking for any reference or recent methodology for Cost Benefit Analysis of Climate & Environmental Information Systems, like a Public Early Warning and Advisory Climate Services for Disaster and Climate Risk Management, would you be able to help me, direct me to a chapter of your information library , or send me some doc...

2. Methodology

The references list was prepared by Norbert Nziramasanga, Energy Expert and Director of the Southern Centre for Energy and Environment (Zimbabwe).
Further references were added by Ingrid Carlier from DEW Point.

3. List of relevant recent materials (reports, methodology) on cost-benefit analysis of climate and environmental information systems, public early warning and advisory climate services for disaster and climate risk management

1) John Twigg & Allan Lavell (2006) **Disaster Early Warning Systems: People, Politics and Economics** Benfield Hazard Research Centre, Disaster Studies Working Paper 16, June 2006.

http://www.abuhrc.org/Publications/Working%20Paper%2016.pdf
This paper is a product of the Third International Conference on Early Warning (EWC III), held in Bonn, Germany from 27-29 March 2006. The conference was organised by the UN International Strategy for Disaster Reduction (ISDR) with support from the German Federal Foreign Office. A Scientific and Technical Symposium formed part of the conference programme and ran for most of the three days. It comprised three sessions: multi-hazard approaches, mega-events, and people, politics and economics. A number of papers were presented and discussed in each session, and reports were presented to the conference's Plenary Session. The plenary report of the People, Politics and Economics Session is published here in full, since it is not available elsewhere. The conference proceedings are at http://www.ewc3.org.

Links to the following documents are available from www.ewc3.org:

- The Conclusions of the Third International Conference on Early Warning
- Checklist for Developing Early Warning Systems
- Global Survey of Early Warning Systems

2) Committee on Climate, Ecosystems, Infectious Diseases, and Human Health, Board on Atmospheric Sciences and Climate, National Research Council (2001) **Under the Weather: Climate, Ecosystems, and Infectious Disease**

http://www.nap.edu/openbook.php?isbn=0309072786

Weather fluctuations and seasonal-to-inter-annual climate variability influence many infectious diseases. The characteristic geographic distributions and seasonal variations of many infectious diseases are *prima facie* evidence of linkages with weather and climate. Studies have shown that factors such as temperature, precipitation, and humidity affect the lifecycle of many disease pathogens and vectors (both directly, and indirectly through ecological changes) and thus can potentially affect the timing and intensity of disease outbreaks. However, disease incidence is also affected by factors such as sanitation and public health services, population density and demographics, land use changes, and travel patterns. The importance of climate relative to these other variables must be evaluated in the context of each situation.

3) **An Investment for Sustainable Development in Pacific Island Countries, Disaster Risk Reduction and Disaster Management - Building the Resilience of Nations and Communities to Disasters - A Framework for Action 2005 - 2015**

There is ongoing and increasing vulnerability of Pacific Island nations and communities to the impacts of disasters. This has led to increased national and regional commitments to disaster risk reduction and disaster management on an 'all hazards' basis in support of sustainable development. These commitments derive from the Pacific Forum Leaders decision in Madang 1995 and the Auckland Declaration in 2004. This Framework for Action 2005 – 2015 has been developed to respond in part to these commitments.

4) UN International Strategy for Disaster Reduction (UN-ISDR) **Integrated Flood Forecasting, Warning and Response System**

http://www.unisdr.org/eng/library/isdr-publication/flood-guidelines/isdr-publication-floods-chapter3.pdf

Establishing a viable flood forecasting and warning system for communities at risk requires the combination of data, forecast tools, and trained forecasters. A flood forecast system must provide sufficient lead time for communities to respond. Increasing lead time increases the potential to lower the level of damages and loss of life. Forecasts must be sufficiently accurate to promote confidence so that communities will respond when warned. If forecasts are inaccurate, then credibility of the programme will be questioned and no response actions will occur. Flood-warning systems must be reliable and designed to operate during the most severe floods. The greatest benefits for an effective flood-warning programme occur when flooding is severe, widespread, and/or sudden, and when communities and organizations are prepared to mitigate impacts. The implementation of an end-to-end flood forecast, warning and response system consists of many components. These components must be linked for successful operation. The interaction of components of the integrated flood forecast system or programme could be represented as a chain composed of many links. Each link must be present and functional if benefits are to be achieved.

5) Food and Agriculture Organisation (FAO) **Assessment of Food Security Early Warning Systems in sub-Saharan Africa**, FAO Policy Brief, Issue 4 Nov 2006.

ftp://ftp.fao.org/es/ESA/policybriefs/pb_04.pdf

The crippling famines of the 1970s and 1980s in sub-Saharan Africa (SSA) prompted the development of national and regional early warning systems (EWS) across the continent. Over the past three decades, governments, regional institutions and development partners invested extensively in establishing EWS as a critical element of the emergency response system. Evidence suggests that these systems have been generally been effective in alerting countries and donors to impending food crises. However, there have been cases where inadequate analysis, together with poor communication and ineffective coordination and response mechanisms, have contributed to acute food security emergencies that might have been prevented.

6) F. Sperling and F.Szekely (2005) **Disaster Risk Management in a Changing Climate**. Discussion Paper prepared for the World Conference on Disaster Reduction on behalf of the Vulnerability and Adaptation Resource Group (VARG).

http://siteresources.worldbank.org/INTCC/214574-1110866984338/20790846/Disaster_risk_management.pdf

Strategic coordination including the exchange of information, methodologies and tools between experts and institutions working on disaster risk management, climate change and development is essential for diminishing the impacts of natural disasters and improving the sustainability of development processes. Important synergies exist between the policy frameworks and practical methodologies for disaster risk management and the course recent scientific advances suggest will be required for adaptation to climate change. Many of the impacts associated with climate change exacerbate or alter existing threats (such as those associated with droughts, floods and extreme events), and adaptation measures can benefit from the practical experience in disaster management. However, some effects of climate change, such as global changes in sea levels, are new within recent human history. As a result little experience is available to tackle such impacts. For these reasons, coordinated action to address both existing and new challenges becomes urgent. While uncertainty remains regarding the precise impacts of climate change, this does not justify inaction. Because climate projections are scenario based and the climate system is complex, uncertainties will always remain. This is also the case with many economic and other projections that play a central role in political decisions and policy formulation. The advances in climate science can help to inform choices and reduce decision making risk.

7) Department for International Development (2006) **Reducing the Risk of Disasters – Helping to Achieve Sustainable Poverty Reduction in a Vulnerable World: A DFID policy paper**.

http://www.dfid.gov.uk/pubs/files/disaster-risk-reduction-policy.pdf

This paper summarises DFID's policy on disaster risk reduction as it applies to natural and technological disasters. It sets out the key elements of disaster risk reduction and why it is important.The paper's aim is to provide guidance to DFID staff. It will also inform other UK Government departments and development partners.

8) Dimitrios Ginoglou, Panayiotis Tahinakis & Chrisanthy Thriskou **Green Accounting As An Information System**.

http://www.sba.muohio.edu/abas/2003/vancouver/Dr.Tahinakis_greenaccounting.pdf

The purpose of this paper is to measure the natural assets and to calculate the environmental benefits and the costs, so as to include all the above in the financial statements. Moreover, this article examines the interaction between the environment and the economic performance of enterprises by the adoption of environmental management systems and information green accounting systems. Moreover, this article examines the possible interaction between the environment and the economic performance of enterprises, by the adoption of environmental management systems and information green accounting systems.

9) Juan Carlos Villagran de León & Janos Bogardi **Early Warning Systems in the context of Disaster Risk Management**, United Nations University.

http://www.unisdr.org/ppew/info-resources/docs/ELR_dt_23-25.pdf

People-centred early warning systems empower communities to prepare for and confront the power of natural hazards. However, the efficiency of such systems is to be measured in terms of lives saved and reduction in losses, which is directly related to the execution of an anticipated response by the people and institutions once a warning is issued. This paper addresses traditional views on early warning systems, and what it takes to transform them into efficient, people-centred systems.

10) World Bank (1999) **Environmental Information Systems in Sub-Saharan Africa: From innovation to management**, World Bank Africa Region.

http://www.worldbank.org/afr/findings/english/find128.htm

The development of Environmental Information Systems (EIS) in Sub-Saharan Africa (SSA) in the 1970s and 1980s was slow, in spite of several efforts to introduce the technology. However since 1990, growth has been phenomenal. Whereas, only one or two institutions in each country were previously active in EIS, over 500 EIS related projects are now under way, involving thousands of African experts, plus numerous development partners from NGOs, the private sector, bilateral agencies and international organizations. Not surprisingly, the number of actors involved in EIS construction is expected to increase even further, until all institutions and organizations involved in environmental management have adopted EIS-related technologies. What has happened? To answer this question we must understand the forces that stimulated EIS development in the past and extract lessons to improve EIS efficiency in the future.

11) RJ Scholes, MR van der Merwe, AM van Tienhoven, **A Survey of Environmental Information Systems in Southern Africa** in *Regional Implementation Plan for Southern Africa*, FAO, 2001.

http://www.fao.org/docrep/005/X9751E/x9751e04.htm#TopOfPage

The purpose of this report is to describe:

1. The existing environmental data collection systems in each country, in terms of who is responsible for them, what data are collected, how the data are made available, and who uses them.

2. The current and projected environmental information needs in each country, in terms of who the users are, the types of information they need, and their preferred mode of supply.

12) Walter Leal Filho (2002) **The Baltic Environmental Information Dissemination System - Using Environmental Informatics As A Tool For Sustainable Development In The Baltic Sea Region**.

http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0103-90162002000300029

The on-going economic development of EU-countries as well of the countries in the C&E European region has been leading to a significant use of a great deal of natural resources as well as to noticeable environmental problems. The lack of a wide-spread environmental awareness from the side of those acting in various sectors (industry, public administration, users) sometimes inhibit the implementation of legislation already available as well as the introduction of new technologies deriving, from example, from marine research. An example of this state of affairs is seen in respect of the implementation of the recommendations deriving from Baltic 21 and VASAB 2010, which illustrate the advantages from a cross-sectorial, open mechanism for the dissemination of environmental information in the region. There are various organizations today which act as suppliers of environmental information in the Baltic Sea Region. However, few, if any, are providers concerned with the various ways in which information on matters related to sustainable development is being used by various groups and audiences. This state of affairs makes it necessary to enhance the current mechanisms and approaches in place, so as to enable the wide-range of environmental information available today from areas such as marine research, to be more widely used. It is equally important that the didactic or educational potential of such information be exploited, so as to not only inform, but also to educate various groups and the general public on matters concerned with the environment in European closed seas and give information to planners and politicians to prepare decisions. In order to address such needs, the project "Baltic Environmental Information Dissemination System (BEIDS)" was set in motion. BEIDS has been taking advantage of the most modern information technologies and has been acting as a focal point for the circulation of intelligent information on aspects of the marine environment, but also emphasising related areas such as transport and sustainable development issues, among a sample of six BSR countries: Denmark, Finland, Germany, Sweden (EU) and Lithuania and Poland (non-EU), contributing to networking and know-how exchange, complementing efforts towards trans-regional cooperation in sustainable spatial planning on the basis of Baltic 21. The results reached to date include: increased awareness of matters related to sustainable development in the six participant countries; enhanced communication exchange and networking among the sample nations; improved information flow and increased participation in events, activities and programmes across the Baltic Sea Region. BEIDS is a prime example of the feasibility of using environmental informatics as a tool for sustainable development.

13) John Leslie King & Edward L. Schrems (1978) **Cost-Benefit Analysis in Information Systems Development and Operation**, The URBIS Group, Public Policy Research Organization, University of California, Irvine, California.
http://portal.acm.org/citation.cfm?id=356718

14) Zh. Ohanian, R. Torossian, A. Gabrielian, J. Gabrielian & S. Gyulmisarian **Environmental Information Systems In Armenia Assessment Report For the Establishment of a UNEP - GRID Compatible Environment and Natural Resource Information Network at the National Level,** Armenian Ministry of Economics and Ministry of Environmental Protection EGIS Initiative Group
http://enrin.grida.no/htmls/armenia/arm_assm.htm

Agenda 21, Chapter 40 on information for decision making outlines two programme areas for bridging the data gap and improving information availability to ensure the sustainable development. According to this guiding document, "relevant international organizations should develop practical recommendations for co-coordinated, harmonized collection and assessment of data at the national and international levels". This report is the first attempt to assess in a comprehensive way current status and general needs of environmental information network in Armenia. Guiding assistance of UNFP/GRID in preparing this report is acknowledged. Objective of the Assessment Report is to help set up continuous and accurate data collection systems and make use of geographic information systems and expert systems models, and a variety of other techniques for the assessment and analysis of data.

15) **Outline of an environmental information system**

Journal	*Environmental Monitoring and Assessment*
Publisher	*Springer Netherlands*
ISSN	*0167-6369 (Print) 1573-2959 (Online)*
Issue	*Volume 36, Number 3 / July, 1995*
DOI	*10.1007/BF00547902*
Pages	*207-215*
Subject Collection	*Earth and Environmental Science*
SpringerLink Date	*Tuesday, December 07, 2004*

The development of an environmental information system necessitates a phased implementation approach. Phase 1 includes the elements that are traditionally viewed as comprising monitoring and assessment activities. Analysis tools for interpretive work are identified including statistics, modelling, and GIS. Phase 2 follows the information flow beyond project reporting to examine the process of decision making. The inclusion of other forms of knowledge beyond the strictly scientific is necessary where the development of multi-sectoral decisions must be made. Phase 3 extends the decision-making process to the policy development and implementation field. This is accomplished by the inclusion of expert systems as advanced decision support systems which enable the manager to test various hypotheses and policy options prior to commitment. In addressing water resource issues, the importance of setting achievable and enforceable sectoral criteria and standards

for industrial, agricultural, and drinking water supplies is discussed with reference to both usage and effluent criteria. Quality assurance and control is an area which must be critically addressed in any water resource project. The implementation of quality control programs must extend from the field sampling procedures and laboratory standard methods to both inter- and intra-laboratory tests and the development and maintenance of databases.

16) UN International Strategy for Disaster Reduction (2004) **Guidelines for Mainstreaming Disaster Risk Assessment in Development**.

http://www.unisdr.org/preventionweb/files/7603_UNISDR2004africaguidelinesmainstreamingdrassessmentdevelopment.pdf

One of the reasons for the divergence between disasters and development is that the assessment of development interventions is deterministic and rarely considers disaster risk issues. Sensitivity and risk analyses undertaken as part of economic appraisal of project address potential threats from variability of project prices but not natural hazards specifically. Also, environmental assessments cover the impacts of projects on the environment, but not the effect of environmental and other natural hazards on projects. A major finding of the review study mentioned above was that disaster risk reduction, including risk assessment, was not yet integrated in national development frameworks in Africa partly because of lack of knowledge of the process of integration. There has been little guidance on how to close the gap between disasters and development. These Guidelines have been designed to help fill that gap.

Further readings:

17) Publications by the Institute for Social and Environmental Transition: http://www.i-s-e-t.org/

18) Anil Markandya & Suzette Pedroso-Galinato (2009) **Economic modeling of income, different types of capital and natural disasters**, Policy Research Working Paper (report No. WPS4875), World Bank.

http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2009/03/24/000158349_20090324155922/Rendered/PDF/WPS4875.pdf

This paper provides empirical estimates of the impacts of natural disasters on different forms of capital (with a focus on human and intangible capital and natural capital), and on real gross domestic product per capita. The types of disaster considered are droughts, earthquakes, floods, and storms and their impacts are measured in terms of the number of people affected or people affected per capita. The authors find statistically significant reductions on the values of human and intangible capital and land capital as a consequence of the disasters, and these reductions are greater when the impacts last for longer periods. Based on the assumption that natural disasters indirectly affect the level of income via losses in capital, the authors estimate a Cobb-Douglas production function using the different forms of capital as inputs. The losses in income are found to vary across different countries and the type of natural disaster studied. However, a common finding is that the losses in income depend generally on two factors: the relative magnitude of impacts of a natural

disaster and the values of different forms of capital. The estimates in this paper are national level figures and cannot be useful in predicting the cost of damages at the local level, where much larger amounts can be experienced per capita. Nevertheless, the estimates provide some indication of magnitudes for different disasters and for different groups of countries. More work and more data are needed to get a dynamic profile for the losses of capital and income. But given the study's results, the time profile is estimated to range typically between two and five years.

19) Forthcoming joint World Bank – UN Assessment of the Economics of Disaster Risk Reduction.