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The newsletter of *The Integrated Assessment Society (TIAS)*

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In This Issue:

The Society

The Integrated Assessment Society is a not-for-profit entity created to promote the community of inter-disciplinary and disciplinary scientists, analysts and practitioners who develop and use integrated assessment. The goals of the society are to nurture this community, to promote the development of IA and to encourage its wise application.

Integrated Assessment Defined

Integrated Assessment (IA) can be defined as the interdisciplinary process of integrating knowledge from various disciplines and stakeholder groups in order to evaluate a problem situation from a variety of perspectives and provide support for its solution. IA supports learning and decision processes and helps to identify desirable and possible options for addressing the problem. It therefore builds on two major methodological pillars: approaches to integrating knowledge about a problem domain, and understanding policy and decision making processes. IA has been developed to address issues of acid rain, climate change, land degradation, water and air quality management, forest and fisheries management and public health.

Feature

Applying risk perceptions in an engineer's world

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Introduction

'FLOODsite' is one of the current large multi-disciplinary European projects that address water-related issues across Europe. The project's focus is derived from an EU directive on flood risk assessment and management, and examines the physical, environmental, ecological and socio-economic implications of flooding from rivers, estuaries and the sea. (http://www.floodsite.net/html/executive_summary.htm). The research is carried out by 37 institutes and universities in 13 European countries.

Despite its inter-disciplinary approach, the FLOODsite consortium has taken a conventional engineering approach to risk [R] defining it as a product of probability [P] and impact [I] [R=P x I]. The probability-impact approach is seen as an objective measurement of risk. This implies that, for example, in a situation of increased flood risk every social entity - whether it be an individual, family, community of people, commercial enterprise, or local authority, etc. - is assumed to have the same perspective on risks without much opportunity for weighing the probability and impact for themselves. It may also be the case that the variability in this perspective is excluded from the assumptions about risk, and that the engineers' view is considered to be the only truth. In other words, risk assessment and management is purely a concern for the experts, and does not leave room for pluralism such as advocated in Integrated Assessment approaches.

However, if the decision for (new) flood mitigation or protection measures is being taken through a participatory process including the involved public or stakeholders, an expert system can merely offer a predetermined set of variations or scenarios for solutions. In some cases this approach lacks flexibility, and can even hamper an interactive participatory process, where the perspectives of stakeholders and/or lay people are meant to be included in a policy process. Unfortunately, in many cases the expertise of engineers and planners is overestimated and seen as the only applicable approach for handling flood risk and related problems. The value of lay knowledge is often underestimated, and there is no freedom of choice, since voluntariness is not incorporated in many legal systems.

Flood risk perceptions

In a recently accepted Natural Hazards article, Raaijmakers et al. (2007) introduce a methodological framework for including flood risk perceptions in a policy process. Moreover, the risk perception approach was made operational in a **spatial multi-criteria analysis**. This idea is based upon a number of theoretical concepts:

1. The *Bayesian way of thinking*: objectivity does not exist in the context of measurement. As a consequence risk is seen as a judgement rather than a fact;
2. Risk perception is characterised as the intuitive judgement of social entities in the context of limited uncertain information based upon Slovic's (1987) *psychometric paradigm*,
3. Kraus and Slovic (1988) distinguish between eight different *risk characteristics*: (1) voluntary versus involuntary risks, (2) chronic versus catastrophic risks, (3) certainly not fatal versus certainly fatal, (4) known to be exposed and not known to be exposed, (5) immediate and delayed, (6) known to science and not known to science, (7) not controllable and controllable, and (8) old and new;
4. Voluntariness is the determining characteristic within the psychometric paradigm, and is defined as the freedom of choice that a social entity has to expose him or herself to a particular risk;
5. According to the *Taxonomic Analysis of Perceived Risk*

(Slovic et al., 1984) the eight risk characteristics can be reduced to the three characteristics *worry, awareness and preparedness*, which makes a risk analysis more feasible.

Relationship between risk characteristics

Risk perception is the relationship between the above mentioned risk characteristics. The relationship of these flood risk characteristics to each other is displayed in figure 1.

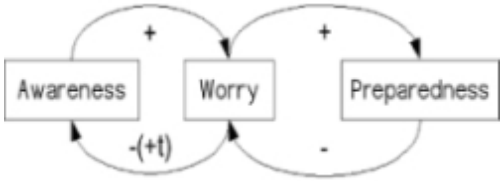

Figure 1: Relationship between flood risk characteristics (Raaijmakers et al., 2007)

Awareness may lead to higher levels of worry, and as a consequence of that, higher preparedness. A better prepared society will worry less about the risk if it is prepared for. Over a longer time scale (+t) reduced worry may lead to a decline in awareness of the risk, as individuals tend to forget risks to which they or their communities have not been exposed over a longer period. However, it should still be noted that awareness will not necessarily lead to worry, and worry not necessarily to preparedness.

The combination of the risk characteristics may result in four types of risk perception:

1. **Ignorance**: An ignorant individual will not worry about, and will not be prepared for the risk because he or she is not aware of it;
2. **Safety**: An individual who imagines him or herself to be safe, will not worry, and is thus not prepared for a risk, because the risk is acceptably small (or believed to be small) or the individual may be prepared to take the risk;
3. **Risk reduction**: An individual who is highly aware, worried and insufficiently prepared will demand risk reduction. When an individual considers exposure to a hazard as involuntary, he or she will assume that the responsibility for preparing the population for a hazard lays in the hands of authorities, instead of taking individual action;
4. **Control**: When an individual feels prepared, then he of she has a sense of control over the risk, and is, as a consequence, less worried.

Trade offs

When an individual accepts a risk, two situations can be distinguished: either the level of risk is acceptably small, and the risks are managed with the maintenance of existing policies, or the (perceived) benefit of a given activity outweighs the risk. The greater the perceived benefit of a particular activity, the greater the risks that an individual, community or society is willing to accept. Once risk is seen as a judgement, the trade-off is one between perceived risk and perceived benefit. Since perceived risk is expressed in terms of risk characteristics, this means that on any level of benefit more and higher risk is tolerated, if people are not worried (Fischhoff et al., 1978).

The case study

The authors of the Natural Hazard paper referred to above, are involved in a FLOODsite task analysing inundation problems in the Spanish Ebro River delta, 200km South of Barcelona. According to the most recent IPCC report, deltaic regions are particularly vulnerable to climate-induced impacts and human activities (Nicholls et al., 2007). In Raaimakers et. al. (2007) this focus is on hazardous flood risk with increased magnitude due to three cumulative causes:

1. **Subsidence**: the natural system *delta* experiences subsidence as well as deposition. In the absence of human impact, deposition is the prevailing process and delta expands as a result. However, since the erection of the *Ribarroja* and *Mequinca* dams, riverine sedimentation has been brought to a standstill, and the delta is lowering;
2. **Sea level rise**: because of anticipated sea level rise a larger proportion of the delta area will be vulnerable to storm surge;
3. As the result of a **higher frequency of storm** events the delta faces a higher risk of storm surge events.

Based on IPCC data, FLOODsite partners from the University of Lund, Sweden calculated a number of storm surge scenarios that were used to confront stakeholders with a possible future development of risk along the Ebro delta coastal region.

Spatial Multi-criteria Analysis (SMCA)

In this specific case study we have chosen to compare land use alternatives as policy measures based upon their performance with respect to risk and benefit. However, the study team together with our FLOODsite task partners from the Universitat Politechnica de Catalunya, first carried out a survey of relevant stakeholders representing agriculture, tourism, local authorities and the salt industry to identify the variety of risk perceptions among the various social entities. The scores on risk perception were translated into weights for a multi-criteria analysis with risk and benefit as the only criteria. The main difference between public and private stakeholders is the level of 'worry'. Private stakeholders are generally less worried than local authorities. Two future land use alternatives (BAU) as well as land use change including an expected sea level rise for 2051 were employed in the calculations. The SMCA resulted in a clear choice for a modified land use.

Conclusion

The approach introduced enables decision makers to include various risk perceptions in a decision making process, and in this way make the selection of policy measures transparent. It can be seen as a support tool in a social learning situation. For example, if a stakeholder is worried about new hazards that imply damage to his or her property, but does not want to agree in to land use change policy, potential consequences can be presented and alternatives may be discussed. Moreover, the reduction of the MCA to the two criteria risk and benefit provides all involved people with a relatively simple approach that minimises uncertainty. At the same time, however, this MCA can handle the complex problem of risk management that includes various perspectives on risk.

Sections of this article are drawn from Raaijmakers, R., J. Krywkow, and A. van der Veen (2007).

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News

TIAS-GWSP Publication on Global Assessments

TIAS and the Global Water System Project have recently released the report of the **Global Assessments: Bridging Scales and Linking to Policy** workshop which was held in the US in May 2007. The report provides the extended abstracts of the workshop presentations under the following themes:

- A Year of Global Assessments
- Scenarios of the 4th Global Environment Outlook
- The Role of Land Use in Integrated Water Management
- Impact Assessment and Decision Support: Linking Policies to Land Use Change and Sustainability Indicators
- Linking Impacts and Adaptation Modeling of Climate Change to the Policy Process
- Global Change Impacts on Water and Food Security - Economic Analyses
- Representation of the Human Dimension in Global Water Assessment

The report is published as Issue No. 2 of the GWSP series, **Issues in Global Water System Research**. It is may be downloaded from: http://www.gwsp.org/downloads/gwsp_issues_no2.pdf

TIAS welcomes new vice presidents

In October, elections were held for TIAS president and vice-presidents. TIAS welcomes back Claudia Pahl-Wostl as President and extends a warm welcome to our new vice presidents, Jan Bakkes of Netherlands Environmental Assessment Agency and Dale Rothman of the Int. Institute for Sustainable Development in Canada. The executive met in November to continue setting the course for 2008 with a focus on broadening the IA community, further developing the forum for science-policy exchange, and engaging our members in our activities. Among other activities, they discussed the follow up to the Global Assessments workshop with a focus on methodological evaluations, the 2008 summer school, implementation of an institutional members rate, profiling members as part of TIAS website resources section, and initiating a guest-in-residence programme.

Events

11-13 January 2008. Workshop: **Environmental Management: More of the Same or Time for Change?**. **Confronting the Manageability Paradigm** Cottbus, Germany. Application deadline: 31 Dec. '07. http://research.erm.tu-cottbus.de

16-18 January 2008. **8th National Conference on Science, Policy, and the Environment - Climate Change: Science and Solutions**. Washington, DC. Of special interest at this event, a workshop on 16 Jan.: Earth Portal and the Encyclopedia of Earth: A Resource for Climate Change, online resources. http://www.ncseonline.org/2008conference/

22-23 February 2008. Berlin Conference on the Human Dimensions of Global Environmental Change: **Long-Term Policies: Governing Social-Ecological Change**. Berlin, Germany. Deadline for full papers: 31 Jan. 2008. http://web.fu-berlin.de/ffu/akumwelt/bc2008/

4-6 March 2008. International Workshop on **Agriculture, Water Management and Climate Change**. Bath, UK. Closing date for registrations and abstract submission: 30 Nov. 2007. www.iger.bbsrc.ac.uk/IWAM/AWMCC_Workshop/

12-14 March 2008. **GLOBE 2008 Conference. Themes: Corporate Sustainability, Climate Change and Energy, Finance and Sustainability, Building Better Cities**. Vancouver, Canada. http://www.globe2008.ca/

6-9 April 2008. **SENSOR International Conference: Impact Assessment of Land Use Changes**. Berlin, Germany. Deadline for online registration: 31 Jan. 2008. www.sensor-conference2008.eu

14-17 April 2008. **Spring Simulation Multiconference**. The Society for Modeling and Simulation International. Ottawa, Canada. http://www.scs.org/confernc/springsim/springsim08/

14-17 April. International Science and Policy Conference: **RESILIENCE 2008 - Resilience, Adaptation and Transformation in Turbulent Times**. Stockholm, Sweden. www.resilience2008.org/

20-23 May 2008. MYRES 2008: 3rd Meeting of Young Researchers in Earth Sciences: **Dynamic Interactions of Life and its Landscape**. http://www.myres.org/myres3/

25-29 May 2008. **Costal Zone Canada 2008**. Vancouver. http://www.czca-azcc.org/

1-6 June 2008. University of the Aegean: **Studying, Modeling and Sense Making of Planet Earth**. Lesvos, Greece. http://www.aegean.gr/geography/earth-conference2008/

6-10 July, 2008. **iEMSs 2008: International Congress on Environmental Modelling and Software - Integrating Sciences and Information Technology for Environmental Assessment and Decision Making**. Barcelona, Spain. http://www.iemss.org/iemss2008/

14-18 July 2008. **12th Biennial Conference of the International Association for the Study of Commons. Governing shared resources: connecting local experience to global challenges**. Gloucestershire, UK. http://www.iascp.org/iasc08/iasc08.html

21-22 August 2008. **2nd International Sustainability Conference ISC 2008: Creating Values for Sustainable Development**. Basel, Switzerland. Abstract submission before 16. Feb. 2008. http://www.isc2008.ch/

1-4 September 2008. **13th IWRA World Water Congress - Global Changes and Water Resources: confronting the expanding and diversifying pressures**. Montpellier, France. http://wwc2008.msem.univ-montp2.fr/

16-19 Oct 2008. **Social Challenges of Global Change - IHDP Open Meeting 2008**. New Delhi, India. http://www.ihdp.org/

Courses

UNESCO Institute of Water Education. Regular short courses for mid-career and senior experts held in Delft. List of available courses and prices: http://www.unesco-ihe.org/education/short_courses/regular_short_courses

01-02 April, 2008. Training Course: **Teaching Adaptive Water Management using an Online Curriculum**. Osnabrück, Germany. http://www.newater.info/everyone/3098

2 June - 29 August 2008. International Institute for Applied Systems Analysis: **Young Scientists Summer Program 2008**. Summer Fellowship in Austria for Graduate Students in Natural Science, Math, Policy and Engineering. Application Deadline: 15 Jan. '08. http://www.iiasa.ac.at/yssp/register/

9 - 19 July, 2008. NeWater-GWSP Summer School 2008: **Managing Change: Methods and Tools for Adaptive River Basin Management**. Königswinter, Germany. Applications accepted from 18 January. Deadline: 30 March 2008. http://www.newater.info/everyone/3112

Openings

Associate/Full Professor in GIScience, University at Buffalo. Closing date: 31 Dec. 2007. https://www.ubjobs.buffalo.edu/

Fellowships in Sustainability Science. Center for International Development, Harvard University. Closing date for applications: 1 Feb. 2008. http://www.cid.harvard.edu/sustsci/grants/

Research Leader, Society, Governance and Institutions. Macauley Institute. Deadline: 1 Feb. 2008, www.macaulay.ac.uk/jobs

Links

Climate Impact Research Coordination for a Larger Europe (CIRCLE): Implementing a European Research Area for the field of climate change. http://www.circle-era.net/

International Long Term Ecological Research Network (ILTER) consists of networks of scientists engaged in long-term, site-based ecological and socioeconomic research: www.ilternet.edu

Nature Reports Climate Change. Authoritative information on current climate change research, comprising news, in-depth features, research highlights, commentaries and reviews. www.nature.com/climate

Mind Map Tool. Free software download: http://cmap.ihmc.us/

The Right to Water. Established by WaterAid and Rights and Humanity. http://www.righttowater.org.uk/

New Publications

Costanza, R., L. Graumlich, W. Steffen, C. Crumley, J. Dearing, K. Hibbard, R. Leemans, C. Redman, D. Schimel. 2007. **Sustainability or Collapse: What Can We Learn from Integrating the History of Humans and the Rest of Nature**? Ambio. Vol. 36, No. 7, November 2007.

European Commission. **Europe4Researchers Newsletter**, Issue 6, October 2007. http://ec.europa.eu/eracareers/index_en.cfm

Flyvbjerg. B. 2006. **Five Misunderstandings About Case-Study Research**. Aalborg University, Denmark. http://flyvbjerg.plan.aau.dk/MSFiveMis9.0SageASPUBL.pdf

Dow K. and T. Downing. 2007. **The Atlas of Climate Change**. Earthscan Books.

Gore, A.. 2007. **The Earth in Balance: Forging a New Common Purpose**. Earthscan Books.

Newig, J. J. Voß and J. Monstadt (eds). 2007. Special Issue. **Governance for sustainable development: coping with ambivalence, uncertainty and distributed power**. Journal of Environmental Policy & Planning, Volume 9, Issue 3 & 4.

UNEP. 2007. **GEO 4 - Fourth report in the Global Environment Outlook series** provides a comprehensive, policy-relevant and up-to-date assessment of, and outlook for, the state of the global environment. An underlying theme is the role and impact of the environment on human well-being, as well as the use of environmental valuation as a tool for decision-making.

United Nations Human Settlements Programme. **Enhancing Urban Safety and Security. Global Report on Human Settlements 2007**. Earthscan Books.

World Water Council News Update: www.worldwatercouncil.org/index.php?id=760

Hertin, J. et. al. 2007. **Rationalising the Policy Mess?** Ex ante policy assessment and the utilisation of knowledge in the policy process. FFU Press. http://web.fu-berlin.de/ffu/download/rep_2007_03.pdf.pdf

Call for Submissions

The online "Open Hydrology Journal" for your publications: www.bentham.org/open/tohydj

TIAS Members are encouraged to submit feature articles and/or news items for future issues of TIAS Quarterly. Contact Caroline van Bers cvbers@usf.uos.de

The TIAS Quarterly

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