

Governance of emerging technologies in the context of sustainable development



Planet Under Pressure 28 March 2012

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Brian Wynne, Lancaster University, *Sound Science for Global Agricultural Policy? recognising the disempowerments which inflated science brings*

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Kathy Jo Wetter, ETC Group, *Towards an International Convention for the Evaluation of New Technologies*

Paul Oldham, Lancaster University, *Mapping Synthetic Biology: The role of Science Mapping in the governance of new and emerging areas of science and technology*

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D3040301 - New models of technology assessment and opportunities for internationalisation

A. Ely *University of Sussex, UK*

It is widely acknowledged that science, technology and innovation have key roles to play in achieving the Millennium Development Goals and addressing the objectives of the Rio+20 summit in 2012. This important function cannot be realised without scientifically-informed and democratically legitimate policies to guide technological developments. Technology assessment is vital to this process - it can assist in identifying priorities and help improve the cost-effectiveness, environmental sustainability and long-term impact of technology policies and investments. Yet conventional forms of technology assessment often fail to deliver on this potential, particularly in the developing world. They provide inadequate accounts of the social, technical and ecological complexities and uncertainties at stake, and pay insufficient attention to the power relations that often drive directions of technological change. New approaches are required that position technologies within dynamic pathways of change at the system level, recognise alternative understandings of these systems by different groups within society and attempt to build resilience in the face of pervasive uncertainty. Fortunately, these new approaches are already emerging in many contexts. The 'new models of technology assessment' addressed in this paper combine citizen and decision-maker participation with technical expertise. They are virtual and networked rather than being based solely in a centralised location such as an office of technology assessment. They are flexible enough to address issues across disciplines and are increasingly transnational or global in their reach and scope. Drawing on work associated with the STEPS Centre project 'Innovation, Sustainability, Development: A New Manifesto' (<http://anewmanifesto.org>), primarily that focussing on 'Emerging Technologies and Opportunities for International Technology Foresight' and 'New Models of Technology Assessment for Development', this paper takes an overview of the new models and, providing case studies from Latin America, Sub-Saharan Africa and South Asia, surveys their potential in relation to pressing global challenges of sustainability and development.

D3040302 - Towards an International Convention for the Evaluation of New Technologies

J. Thomas, K.J. Wetter *ETC Group, Canada*

Following multiple technology policy controversies and in the face of a rapid proliferation of emerging and converging technologies, the current vacuum for oversight of innovation is no longer a credible option. Successive waves of disruptive technologies inequitably create winners and losers - often drowning the most vulnerable in the churn of technological change. The Rio+20 conference in June 2012 provides an opportunity for the global community to establish rational, open, transparent and just processes for assessing emerging innovations in order to place appropriate governance around them. This talk explores possible approaches, principles, ways forward and processes for constructing an international mechanism for evaluating emerging technologies and practicing good precautionary governance.

D3040303 - Mapping Synthetic Biology: The role of Science Mapping in the governance of new and emerging areas of science and technology.

P. Oldham, B. Wynne, O. Forero, S. Hall *Lancaster University, UK*

Public attention to new and emerging areas of science and technology is typically initiated through pioneering work by NGOs with academic research following some distance behind. Academic approaches to assessment eventually involve the use of bibliometric or scientometric techniques to map the scientific and patent literature using a variety of tools. The results are typically published in obscure journals and receive limited attention outside of closed policy and funding circles. This situation is changing as a result of new approaches to large scale science mapping and increasing access to affordable and accessible software tools to visualise and interact with scientific data. This presentation focuses on efforts to map the emergence of synthetic biology in geographical and digital space using open source tools such as Gephi and interactive analytics software such as Tableau. The paper argues that mapping can create common ground that helps to bridge the gap between purely expert assessment and grassroots based public assessments.

D3040304 - Holistic Concepts for Sustainability Assessment of Synthetic Organisms

H. Meyer *ENSSER, Germany*

Introduction: Since more than 25 years, public dialogues, expert consultations and scientific publications have concluded that a comprehensive assessment of the implications of genetic engineering in agriculture and food production needs to include health, environmental, social and economical aspects, but only very few legal frameworks allow to assess the two latter aspects. Creating such a holistic assessment framework will be even more important in the context of using synthetic organisms.

Methods: The contribution focusses on an analysis of the deficiencies of existing risk assessment approaches with regard to assess effects beyond the level of individual organisms. Appropriate methodologies, decision making structures and institutional arrangements to ensure a critical evaluation of synthetic organisms will be presented.

Results: The dominant GMO risk assessment methodology has been developed to answer basic questions to enable expedient decision making and will be also applied for synthetic organisms. Current national and international models as the Cartagena Protocol on Biosafety have in general not expanded this approach to ensure a sustainability assessment of new organisms. Methodologies that take into account complex environmental and landscape aspects should be applied. More holistic concepts have been developed, for example the Organisation for Economic Co-operation and Development (OECD) concept of systemic risks which includes socio-economic aspects. International bodies as the OECD, the Convention on Biological Diversity (CBD) and the European Union (EU) have developed the Strategic Environmental Assessment (SEA) as an instrument that includes the additional aspects of risk assessment as demanded by many stakeholders. Interestingly, there had been neither attempts yet to link the existing frameworks of GMO risk assessment and SEA nor to develop appropriate frameworks for synthetic organisms.

Discussion: It is recommended to adapt current models of SEA to assess the systemic risks of synthetic organisms. It is suggested to revise the international and EU GMO legislation accordingly.

D3040305 - Biofuels : A Governance Failure

M. Alexander *ActionAid UK, UK*

Biofuel policy provides an excellent case study of the governance of emerging technologies in the context of sustainable development. It is a concrete demonstration of governance around a new technology failing to establish an effective means of critically evaluating safety, ethics, societal and environmental impacts. Examining biofuel policy also demonstrates that once policy is set it is very difficult to modify, even if clear scientific evidence of harm arising from the new technology is presented. Rio+20 offers a significant opportunity to apply the lessons learned from biofuel governance to ensure other new technologies are effectively regulated.

Biofuel policies were set in various countries when biofuel use as a climate change mitigation strategy was a new technology. These policies were therefore created before there was a sufficiently detailed understanding of the nature and scale social and environmental impacts of large-scale biofuel use. Now that scientific studies have been undertaken, it is clear that these policies are allowing biofuel use to undermine climate change and sustainable development objectives. Despite this knowledge, governments have failed to update their policies to reflect the ethical, societal and environmental challenges biofuels present.

Currently, biofuel use is concentrated in ground transport, with some use in power generation. Governments have subsidies and legal mandates which legally require biofuel use. The stated aim is a reduction in greenhouse gas emissions. However, in no case are there sufficient safeguards to ensure that only biofuels with greenhouse gas emissions below the equivalent fossil fuel are used. In addition, no government has effective policy to ensure that the known impacts on food prices, land rights or biodiversity are avoided. At the same time, governments are failing to implement proven alternative responses to greenhouse gas emissions from transport such as mandating higher energy efficiency standards or investing more in public transport.

D3040306 - Sound Science for Global Agricultural Policy? recognising the disempowerments which inflated science brings

B. Wynne *University of Lancaster, UK*

'Sound Science' is regularly repeated as a mantra, yet a contested one, in global policy for GMO regulation. Promoters of GM technology argue that if the same demands were made upon non-GM agricultural technologies as they are for GMOs, no food would be allowed to be grown and marketed, anywhere. Sceptics or opponents argue that GM science is immature, and as such it brings unstable factors when commercialised into environmentally open agricultural and food systems. These elements of ignorance, as distinct from risk alone, may well introduce unpredicted and unintended consequences which could be irreversibly harmful. These issues are analysed and argued on the basis of the scientific evidence which may be available, as issues of risk and (sometimes) benefit. However in addition to the problem that this risk science - science for protection - is more provisional and uncertain than is normally admitted by government and industry agents, thus bringing 'sound science' itself into question, a prior unresolved issue exists about what counts as 'sound science' for GMOs, or the real issue, global food security, at the 'front-end' or upstream science which is devoted not to protection, but to production, or innovation.

This paper will identify the ways in which public policy and debate relentlessly define GMOs as a scientific issue, or 'risk issue' alone, and also delineate which other issues are deleted by this excessive scientisation of the issue; and how public concerns about such non-scientific dimensions of global food security and justice are insistently reduced to 'risk' concerns, which are deemed solely scientific issues so not ones for legitimate public assertions of concern anyway. Some possible ways of improving this state of affairs, of enhancing innovation designed to assist poor societies other needy groups to maintain food sovereignty and security, will also be offered.

D3040307 - Towards a People's Food System: Rebuilding agri-food research through participatory democracy.

T. Wakeford¹, M. Pimbert¹ *¹SPEAKS, UK, ²IIED, UK*

In Europe alone, the top ten food companies spend over a £1 billion annually on food research. The questions they ask of the research community helps shape what we eat, our health, the environment and the political choices we face around food and farming. Research processes have rarely involved the perspectives of non-experts. Yet, twenty years of 'citizen science' projects have shown that people whose wisdom comes from their life experience have often built up wisdom that could improve research and the resulting sustainable food policies. Yet, because most people lack formal training as food 'experts' we are usually denied a voice in most discussions at the scientific and political level. Despite citizens' juries taking place across the world, such as in India, Mali and across Europe, farmers in the Global South have been denied the space to voice their views on the wisdom of changing the system they have sustained for generations over to GM crops. Based on 15 years of attempts to re-democratise the food research system around the world, it seems that a new movement for food sovereignty could be moving closer following the current crisis in global capitalism. We much challenge researchers, corporations and policy-makers to take the opportunity to engage with 'citizen science' projects constructively, rather than dismissing them as ignorant opposition.