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Towards a more sustainable agri-food security
and food policy: beyond the ecological fallacies?

Terry Marsden

About Sustainable Places

The Research Institute's mission is to reinforce Cardiff's reputation as a unique international leader in the emerging field of sustainability science, by bringing together leading scholars and research clusters across a wide-range of academic disciplines. Through making these new connections, the Institute will tackle the vital issue of sustainability and sustainable places in a fundamentally new way, seeking solutions to the enormous environmental and social challenges facing humanity.

Through new scientific approaches it will place stronger emphasis on sustainable living in sustainable places by studying the complex and dynamic interrelations between ecology, society and economy. By studying these interactions at local, national and international levels, the Institute will place itself at the centre of global debates, drawing on existing expertise in the scientific fields of planning and applied social and psychological sciences, business and law, biological and earth sciences, engineering, architecture and health.

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Introduction: into a new era

Since the food price hikes of 2007-8, and the continuing volatilities in global food supply and demand since, there has been a significant growth in policy reports and statements regarding the problems of global food security¹. This has rightly reinforced the RCUK research councils' decision to make this one of its 'grand challenges', and has recently led to a new synthesis published by the UK Government Office for Science, entitled: 'The Future of Food and Farming: challenges and choices for global sustainability'². It is not necessary here to re-iterate all of the main arguments as to why this is now a renewed and pressing international policy issue, but it is a good moment to begin to assess the general policy landscape and framing of the debates, given, as I shall argue below, some significant gaps or missing links which are emerging in the ways in which arguments and solutions are being posed.

One key question (which I and Ina Horlings have recently posed in an article in *Global Environmental Change*),³ is why is it proving so difficult to arrest the twin problems of resource depletion and climate change vulnerabilities by developing more sustainable and 'place-based' agricultures? To answer this question we have to go beyond the rhetoric of many of the major reports now before us, and address the more prosaic question of what are the obstacles to adaptive change necessary within the agri-food sector? Once we more clearly identify these it may be easier to see how we might then begin to examine the potentialities and opportunities for adaptive changes which could lead to both more sustainable *and* productive agri-food systems. It is argued here that these opportunities and potentialities will have to indeed be 'place-based'; and as such will not lend themselves to generic or globalised 'one-size fits all' solutions associated with genomic technological fixes or generalised notions of 'sustainable intensification' (Foresight, 2011)⁴. One of the problems with most of the recent policy statements is that they have not addressed the issue of context-dependent sustainable 'place-making'; and they have tended to assume, albeit with scattered attention to some selected case studies of 'good practice', that the answers as well and the solutions with the current unsustainability of agri-food lies in addressing the aggregate problems rather than those which are more spatially specific. Agriculture will have to return to being what it was: a more embedded, connected and localised activity serving and being served by its city regions.

If one of the obstacles in our thinking about both the problems and solutions concerning unsustainable food lies with the dominant aggregated conceptualisations of the problems- a sort of 'ecological fallacy'; another is the failure to really appreciate *agriculture* as an interdependent and integrated component in complex human, cultural and ecological systems. For too long, and in the advanced world especially, we have both in policy and academic terms, tended to treat agriculture as a separate and independent sector. This secular way of seeing agriculture is now coming back to haunt us, as we now witness how it is inextricably linked to the wider ecologies and cultures of place. It is constantly articulated, for instance, (not least by the now disbanded Sustainable Development Commissions' final statement (2010) on food policy)⁵, that global agriculture accounts

¹ This paper is based upon a more extensive review of literatures and research on agri-food initiatives and policy which is recorded in Horlings, L and Marsden, T.K (2011) *Towards the real green revolution? Exploring the conceptual dimensions of a new ecological modernisation of agriculture that could 'feed the world'*. *Global Environmental Change*, 2011.

² Foresight, *The Future of Food and Farming* (2011). The Government Office for Science, London, UK.

³ Horlings, L and Marsden, T.K (2011) *op.cit.*

⁴ Foresight, p35 *op.cit.*

⁵ Sustainable Development Commission (2011) *Looking Back, Looking Forward: Sustainability and Food Policy, 2000-2011.*

for about 70% of all freshwater extracted for human use (via irrigation systems), and that the food system is a major source of land, forestry, fisheries and water degradation, with 15 out of the 24 worlds eco-system services being degraded or used unsustainably according to the Millennium Ecosystem Assessment (2005)⁶. Livestock farming gets an even worse press in these debates, as it accounts for 40% of the UK citizens' agriculture water footprint and 57% of agricultures carbon and methane emissions. These sort of aggregated and sectoralised statistics certainly indicate the size and proportional nature of the problem of the unsustainability of many current agricultural practices. But they should also indicate the inherent multifunctional role in which agriculture *could play* in potentially adapting to these unsustainabilities. Such 'facts' about the negative contribution of conventional agricultures to the wider and severe problems of resource depletion and carbon emissions should indeed serve as a significant 'wake-up' call for scholars and policy makers, in that these demonstrate the explicit interdependence and integrative potentials of agriculture to affect its wider ecologies and social systems in profound ways. Hence any 'solutions' to these unsustainabilities will indeed need to adopt a much more integrative, as well as spatially-based approach. We thus cannot any longer divorce agricultures from the wider social and ecological spaces in which they are created, or the complex interdependencies they help to sustain.

I thus want to argue here that we now urgently need to move beyond these aggregated and sectoralised ecological fallacies in our attempts to deal with creating more sustainable and place-based agri-ecological systems. Whilst we clearly must not lose sight of the macro- global picture, we need to realise that in order to paint realistic alternatives it is necessary to adopt a more creative eco-economy paradigm which re-'places', and indeed re-locates agriculture and its policies into the heart of regional and local systems of ecological, economic and community development. This is no more clearly exposed at the moment than in the 'Arab Spring' in the Middle East, where the current uprisings are underlain by growing food and water shortages, price hikes, and fast growing populations in countries like Yemen and Syria. Saudi Arabia is actively purchasing land and water rights elsewhere in order to cope with pending water and food shortages.⁷ Some regions of China are following this course of action, leading to internationalised 'land and resource grabbing' as palliatives to impending shortages. The irony is that the more governments and scholars recognise the need to make a transition in agri-food to low carbon alternatives, the greater the international 'race-to- the- bottom' competition intensifies to find exploitable palliatives to the agri-food 'growth machine'. Yet, as the saying goes about charity, the solutions and priorities should start at home by recalibrating and re-framing more integrated and embedded notions of agri-food into regional and local systems.

The current food debate is thus dominated by aggregated and sectoralised 'bio-economical' solutions which still tend to side-step and deny the embedded nature of agri-food. This is a sort of active process of 'unknowing the known' and creates and maintains a set of key 'missing links' in the framing of policy debates. What is underestimated, are the social, cultural, political and spatially embedded aspects. These include:

Socially, we have seen a large decrease in recent decades of agricultural employment and a loss of farmers' freedom with more dependency upon privately regulated global markets, retailers, privatised research and policy-measures. This means in many regions, that at just the point when a sustainable transition is necessary in their agri-food systems, the local communities have lost or reduced the social and skill capacity to engender such changes. Re-building the social and knowledge capacities to create sustainable alternatives becomes limited and in many cases constrained by generic techno-science solutions.

⁶ Millennium Ecosystem Assessment (2005) United Nations, New York.

⁷ See Brown Lester,(2011) The nest Arab battle, The Guardian, 3.4.11; and 'World on the Edge' Earth Policy Institute.

Culturally, the environment has been reduced to a series of concerns about resource inputs, waste and pollution emissions, reducing cultural needs and non-anthropocentric values (such as reflected in the concept of wilderness), to monetary terms (as can be seen as reducing these inputs into different packages of ‘environmental goods and services’). The culture of ‘agri-culture’ itself, expressed in craftsmanship and a large variety of farming styles, has become more marginalised as the influence of external institutes such as extension services and bio-economic scientific research became more dominant.

Politically, a ‘hygienic mode of regulation’ has become dominant in agri-food in the form of bureaucratic forms of environmental safeguards, risk management and instruments. Private and public forms of regulation have led to a schematisation which creates new regulatory barriers to market entry for many smaller producers and processors.

Spatially, agricultural production has been decoupled from space and place, visible in the form of footloose production, international food transport, ‘lean’ logistics and traceability, and the deconstruction and fragmentation of food into different but standardised, value-added components. This gives the super intensive producer, processor and corporate retailer the power to exchange their commodities worldwide, making many small farmers more vulnerable to global markets.

Towards a sustainable agri-food eco-economy?

To address these ‘missing links’ we can postulate a process of ‘Real Ecological Modernization’ which re-inserts these key factors and is embedded in the different contexts of space and place.⁸ Table 1 provides an overview of the differences between the dominant food paradigm and a ‘real’ ecological modernisation of agriculture. That is, one which overcomes both of the ecological fallacies mentioned above.

Table 1. Competing paradigms for ecological modernisation in agri-food policy

Dimensions	The dominant food paradigm: bio-economy	Real ecological modernisation of agriculture: eco-economy
Economic regulation and control	Corporatization Productivity (yield) oriented Aggregated framing of food crisis Maintenance of the cost-price squeeze for local producers	Place-based-agri-food networks Integral approach between production of food and interdependent ecologies Food security linked to networks of local and regional actions.

⁸ Horlings, I. and T. Marsden (2010), Towards the real green revolution? Exploring the dimensions of a new ecological modernisation of agriculture that could ‘feed the world’, BRASS Working paper, University of Cardiff, UK.

Technological	Technology development as economically driven	Technological generation as a demand-driven process
Ecological	Ecological and genetic engineering (industrial ecology) designed to reduce externalities through 'sustainable intensification'.	Based on agro-ecological principles linked to ecological space and place. Local knowledge creation.
Social-cultural	Dependency, scientification, rational man-nature relation, loss of farmers freedom/ agricultural employment	Sovereignty, Autonomy Synergy between man-nature Demand-driven research (mode 2 science) Labour and skills-intensive
Spatial	Globalized Export-oriented Use of external resources Locational criteria for production footloose and/ or associated with proximity of inputs. Shortages in inputs 'solved' by extending international corporate property rights.	Locally embedded in the community Endogeneity Use and reproduction of local resources. Locational criteria embedded in terroir and its multiple branding.
Political	Top-down steering and regulation One-direction communication by extension services Power concentrated at multinationals and large retailers based upon notions of 'free-trade' and the minimisation of 'state-aids'.	Enabling policy Participatory approaches Influence of communities in agri-food networks Regional governance facilitating network and consortia development. New innovation sharing and collaboration. Self sufficiency in the context of fair trade.

This includes a large variety of sustainable farm practices and systems based on agro-ecological principles, which take the form of 1) organic agriculture 2) urban and peri-urban agriculture 3) conservation agriculture or zero-tillage 4) low-input agriculture 5) agro-forestry 6) aqua-culture. The question remains, however, if these practices can in fact really 'feed the world'? Whilst we must recognise that solving food security involves as much concern with allocation as it does with production, nevertheless, it is important to examine if there is a basis of reliable and scientific evidence that suggests that eco-economic practices and processes can contribute to food security as well as food sovereignty? And if there is, what are the impediments for mainstreaming these eco-economic processes? There are indications in the international literature that local-scale food systems are more sustainable because they have 'tight feedback loops' linking consumers, producers

and ecological effects, which enables positive adaptive responses to negative effects⁹. This suggests that locally- embedded food systems are more resilient, and they do not necessarily deny meeting wider international (fairer) trade commitments.

During the international conference on organic agriculture and food security in 2007 in Italy¹⁰ it was stated that organic agriculture could produce enough food on a global per capita. A recent FAO analysis, based on more than 50 cases in the USA and Europe, and just over a dozen studies in developing countries, showed that organic farms are more economically profitable, despite frequent yield decrease¹¹. Higher outcomes are due to premium prices and predominantly lower production costs. These conclusions can also be drawn from studies in developing countries, but there, *higher* yields combined with high premiums are the underlying cause for higher relative profitability.

A survey of the University of Essex has described 286 agro-ecological projects in 57 countries.¹² Their results showed that sustainable agriculture has led to an average 93 percent increase in per-hectare food production. The relative yield increases are greater at lower yields, indicating greater benefits for poor farmers and for those missed by the recent decades of modern agricultural development.

Some of the most path-breaking examples of sustainable agriculture can be found in developing countries of Africa, Asia and Latin America. The 'Ensete' agroforestry system for example, is a five thousand year- old farm system, practiced by the Gedeo people in the highlands of Southern Ethiopia¹³. The system is able to produce a large variety of products such as Ensete, a high quality food, one of the best coffees of the world, honey, timber and a superior race of highland sheep. The perennial cropping system has a good resilience against droughts, thanks to the Ensete plant which captures water with its fan-shapes leaves and fibrous root-system which also prevents erosion.

In Brazil, there are now some 15 million hectares under 'Plantio Direto' (also called zero-tillage'). Many of the Clubes Amigos da Terra, literally 'friends of the land clubs', have been closely involved in this transformation. Zero-tillage means no mechanical soil disturbance; permanent soil cover and judicious choice of crop rotations. The approach led in a few years to higher yields in crop production, decline in labour costs, a diversification into livestock as well as agro-processing, resulting in improved food security of small farmers.

⁹ Sundkvist, A., R. Milestad, A. Jansson (2005). [On the importance of tightening feedback loops for sustainable development of food systems](#). *Food Policy* 30 (2): 224-239.

¹⁰ Scialabba, N. E-H (2007), *Organic Agriculture and Food Security*, International conference on organic agriculture and food security, 3-5 May 2007, Italy, Food and Agriculture Organization of the United Nations.

¹¹ Nemes, N. (2009). *Natural Resources Management and Environment Department Comparative Analysis of Organic and Non-Organic Farming Systems: A Critical Assessment of Farm Profitability*, Natural Resources Management and Environment, Department Food and Agriculture Organization of the United Nations, Rome.

¹² Pretty, P. and R. Hine (2001), [Reducing Food Poverty with Sustainable Agriculture: A Summary of New Evidence](#), Primal report from SAFE-World Research Project (The Potential of Sustainable Agriculture to Feed the World), University of Essex, Colchester, UK.

¹³ Kippie Kanshie, T. (2002). *Five Thousand Years of Sustainability? A Case study on Gedeo Land Use (Southern Ethiopia)*, Treemail publishers, Heelsum.

In China, sustainable agricultural development is more government-led. There has been a rapid expansion of self-identified organic agricultural products in rural China, for example is the experiment in the Fushan village of 224 farm households. This has steadily derived benefits for the wider rural economy as well as the farms themselves. Analysis of the soils has shown improvements in the state of soil structure and nutrient composition due to the development of applying biogas residue. This also led to large reductions in fertiliser applications and increases in crop yields.

From ecological fallacies to real ecological modernisation

There is enough evidence at a case study level to severely question the legitimacy of the bio-economic paradigm as the only or indeed dominant answer to the new mode of global Malthusianism and 'sustainable intensification' which it now vibrantly articulates. However, this legitimacy will not be seriously challenged if the debates remain at the aggregated global level without critically confronting or transcending both the problems of scale, diversity, context dependency and the sanctity of generic ('one size fits all') technological solutions over more place-based technologies and knowledges.

Eco-economical approaches could '*feed the world*', and thereby contribute to a 'real green revolution'; but this requires a more radical shift in debate amongst scientists and policy makers about fostering new types of diverse and embedded agri-food eco-economies. A shift which many groups of urban consumers are now demanding. This is one which also includes re-thinking market mechanisms and organisations, more innovative institutional flexibility on a regional scale, interwoven with active farmers and consumers participation; and a re-direction and widening vector of science investments to take account of translating often isolated cases of good practice into mainstream agri-food movements. It also needs to recognise that the onset of bio-economic models can in themselves marginalise the capacities for eco-economies to flourish and to 'scale-up' in particular places. The times are now urgent for this re-thinking and debate, and they need to critically inform more effectively the growing legitimacy of bio-economic solutions as to why more and more people are going hungry on the one hand, and becoming obese on the other. In macro-economic and policy terms, these issues are now of such global and local concern that they will require national and international government bodies to proactively incorporate agri-food security and sustainability into Foreign, International Development and (Treasury) macro-economic policy, rather than 'ring-fencing' them to their rural affairs or agricultural departments.