Home Economics

Planting the Seeds of a Research Agenda for the Bioregional Economy

‘Nature is not a place to visit, it is *home*’

Gary Snyder

1. *Introduction*

In a world of climate change and declining oil supplies what is the plan for the provisioning of basic resources? Green economists suggest a need to replace the globalised economy, and its extended supply chains, with a more local economy (Hines, 2000). But what does this mean in more concrete terms? How large is a local economy, how self-reliant can it be, and what resources will still need to be imported? This paper proposes the concept of the ‘bioregion’—developed and popularized within the disciplines of earth sciences, biosciences and planning—as a heuristic device to facilitate the reconceptualisation of the global economy as a system of largely self-sufficient local economies.

A bioregion has been defined as ‘a unique region definable by natural (rather than political) boundaries’ (Thayer, 2003: 3). A bioregional economy would be embedded within its bioregion and would acknowledge ecological limits. From an economic perspective, bioregions are natural social units determined by ecology rather than economics, and that can be largely self-sufficient in terms of basic resources such as water, food, products and services. A bioregional approach to the economy would mean living a rooted life, being aware of where your resources come from and where your wastes go. Unlike political boundaries, bioregional boundaries are flexible, but should be guided by the principle of subsidiarity in the case of any individual resource or service. Within the bioregional approach beginning with the local is a principle that trumps principles such as price or choice. Within our

bioregional economy we are responsible for all our waste and we have a neutral impact on the natural cycles that maintain the earth in balance, primarily the carbon cycle.

A bioregional approach to economics thus assumes a different system of values to that which dominates neoclassical economics. The global economy is driven by growth, and the consumption ethic that matches this is one of expansion in range and quantity. Goods are defined as scarce, and access to them is a process based on competition. The bioregional approach challenges every aspect of that value system. It seeks a new ethic of consumption that prioritises locality, accountability and conviviality in the place of efficiency, expansion and profit. Bioregional production and exchange should take place within a co-operative framework, more akin to the community-based food initiatives studied by Gregory and Gregory (2010). An analysis of the British co-operative movement suggests that these co-operative values may have a intrinsic link with an environmentally sensitive approach to the economy (Cato *et al*., 2006).

The paper begins with an account of the bioregion within the disciplines of earth sciences and biosciences including the work of Kirkpatrick Sale, Bob Thayer and Mike Carr. It then seeks to apply the concept as developed in these other disciplines to the issue of the production and distribution of resources with reference to the four concepts which I have identified elsewhere as being key to the development of the bioregional economy: locality, accountability, community, and conviviality (Cato, 2007). The allocation of resources is performed by the market in the contemporary globalised economy. In a bioregional economy, I argue, we might find a larger role being played by systems of social distribution which may share features with traditional commons. The paper then offers the Somerset Levels of the south-western UK as a prototype of a bioregion. Finally, the beginnings of a research agenda for bioregional economics are sketched.

2. *Bioregionalism: Provenance and Relevance of the Concept*

The concept of bioregionalism grew out of work undertaken by environmentalists in California and the US West Coast in the late 1960s and early 1970s. The focus was the need to respond to the environmental crisis by developing a different, more embedded relationship with their landscape. This included deepening their knowledge of local climate, ecology, species and culture and drew heavily on the native American tradition:

A *bioregion* is literally and etymologically a 'life-place'—a unique region definable by natural (rather than political) boundaries with a geographic, climatic, hydrological and ecological character capable of supporting unique human and non-human living communities. Bioregions can be variously defined by the geography of watersheds, similar plant and animal ecosystems, and related identifiable landforms and by the unique human cultures that grow from natural limits and potentials of the region (Thayer, 2003: 3).

Amongst proponents of bioregionalism, globalisation is seen as a system that divorces people from their locality; bioregionalism helps them to relearn their place in space, a process that is inherent in restructuring our relationship with our planet (Drenthen, 2009). It is, as Gary Snyder has it (1990: 44), 'the entry of place into the dialectic of history'.

Political economist John Barry provides a critical account of bioregionalism as a social theory, which focuses on the view bioregionalists have that citizens in complex modern societies,

'have 'forgotten' that the economy and all its works is a subset and dependent upon the wider ecosystem. . . Modern citizens have not only lost contact with the land, and their sense of embeddedness in the land, but at the same time they have lost those elemental social forms of more or less intimate and relatively transparent social relations. Thus a basic aim of bioregionalism is to get people back in touch with the land, and constitutive of that process is the recreation of community in a strong sense. (Barry, 1990: 9).

Barry makes clear the link between a bioregional approach to life and a very strong sense of local identification.

This offers a more values-driven approach to provisioning which can, on this view, incorporate a higher level of accountability and responsibility for the local natural environment. One of the key questions of this paper is to what extent this experience can be generalised beyond its Californian home, and how far can we derive implications for an economy that finds a place within the environment, rather than merely exploiting the planet's resources.

The US West coast has a quite distinct economic and cultural history. It still retains large areas of wilderness land and in large part is sparsely populated. There are major differences in scale when compared with European environments. The nature of relationship with the land is also different, both in terms of the exploitation of the frontier and the contrasting 'land ethic' (Leopold, 1949) of the native peoples. Finally, and significantly, the persistence of wilderness has meant the continued existence of megafauna, which, while under threat, are a part of the ecosystem in a way they are not in the UK or much of industrialised Europe.

Interestingly, the other part of the world where the concept of 'bioregion' has had significant intellectual purchase is the antipodes, which has its own indigenous community whose land ethic has persisted and may have influenced the thinking of intellectuals and policy-makers. Bioregions are used to support the development of environmental policy, with considerable investment of energy by policy-makers into mapping their territories in terms of bioregions. The Australian government has produced a map of the country's 85 bioregions,[1] 'each of which is a large geographically distinct area of similar climate, geology, landform, vegetation and animal communities.'

In spite of the profound implications for resource allocation of the environmental crisis, economic considerations have remained limited in vision and scope (Stern, 2006), with few academic economists asking fundamental questions about what sort of lives will be possible in an era of energy limits as a result of pro-climate policies and peak oil (North, 2009). In environmental circles these questions have been common currency for several decades: 'The critical argument now within environmental circles is between those who operate from a human-centered resource management mentality and those whose values reflect and awareness of the integrity of the whole of nature.' (Snyder, 1990: 194). Part of the purpose of the research agenda proposed here is to force this discussion into the arena of academic economics.

Outside the academy questions are being asked about the level of consumption that will be possible within the new paradigm and about the need to develop a new ethic of consumption. A prominent recent example is the work of Jackson (2009), whose title 'prosperity without growth' implicitly questions the prevailing consumption ethic and suggests that the economy needs to respond to a new value system with less focus on materialism. Such a commitment is shared by green economists (2009), who challenge the prevailing values system of the neoclassical economy, and in particular its focus on material growth regardless of the environmental consequences.

In the view of Kirkpatrick Sale, sufficiency is unproblematic:

Certainly there is not a single bioregion in North America or elsewhere . . . there are sufficient resources to provide a stable and satisfying life, though indeed their abundance and splendour might vary greatly. Certainly there is not a single bioregion in this country, even at the georegional level, that would not, if looked to all its natural endowments, be able to provide its residents with sufficient food, energy, shelter, and clothing, their own health care and education and arts, their own manufactures and crafts. (Sale, 2000: 75).

However, such optimism is largely an article of faith, with little energy dedicated to studies. An honourable exception is the work carried out by Simon Fairle (2007), which attempts to compare the capacity of the UK to feed its population domestically, based on a range of agricultural systems. His findings are optimistic, but further detailed research along the same lines, together with a thorough survey of available agricultural land, is essential and urgent. Similarly, concerns about food security are beginning to surface in policy circles, and as food becomes in shorter global supply we begin to see the fallacy of the idea of a post-agricultural economy and the vulnerability of being an importer in the global supermarket. As Barry has argued, bioregionalists have always maintained that 'whereas it may be possible to have a "post-industrial society" we cannot have a "post-agricultural society". Yet this is precisely the 'misperception' of the majority of citizens in the western world. (Barry, 1990: 9).

So while concerns about the security and sustainability of a distribution system that relies on extended global supply chains are beginning to emerge, there is not, as yet, a coherent intellectual framework within which discussions about alternative provisioning systems that would imply less dependence on fossil fuels and result in lower levels of CO_2 emissions. It is the central thesis of this paper that bioregionalism is a concept that might play a significant role in building such a framework and organising our ideas about how we might plan a sustainable resource provisioning system.

3. *From Localisation to the Bioregional Economy*

Hines (2000) opened the argument for a relocalisation of economic systems with his 'manifesto' for localization. However, beyond this useful introduction to the problem and sketch of some possible policies there has been little work in terms of detailing precisely how local economies will produce, derive or allocate their produce. Sale (2006) has begun this task and produced a list of elements to guide the development of a bioregional economy, which

include a range of criteria of which the fundamental value is one of 'reverence for life'. The vision is of self-sufficient communities, with a self-reliant bioregion.[2] In an earlier paper (Cato, 2007) I began to expand this vision by listing the key characteristics of the bioregional economy—locality, accountability, community, and conviviality—and these form the structure for this section.

Locality

Arguments for localization are motivated primarily by concern for the unsustainability of the global supply chains that the present structure of resource provisioning relies on. These are unsustainable environmentally, because of the climate-damaging carbon emissions they inevitably entail, and unsustainable economically, in an era of diminishing and therefore increasingly expensive oil supplies. As North (2009), argues, 'While the global economy has gone through a process of time-space *compression* (Harvey 1992), the need to cut emissions and reduce energy use means it now needs to go through a process of time-space *re-extension* where transport costs again become significant in terms of both finance and emissions.'

The rhetorical call for localization which has been echoing around the environmental movement for the past decade, was not followed up by any precise theory about how local economies will produce, derive or allocate their produce. There is not even a realistic definition of what a local economy is. Douthwaite's (1996) rule-of-thumb proposes the area covered by a local newspaper (on the basis that this is how far you are prepared to travel to buy something in the free ads.) while the area you are prepared to travel to share beer is apparently a provisioning boundary fixed by the Majangir people of Ethiopia (Pilley, 2009). Woodin and Lucas (2004: 69) argue against fixed boundaries suggesting that 'what constitutes "local" will differ from one place to another and from one product to another . . . Some countries are big enough to aim for increased self-reliance within their own borders,

while smaller countries would look first to a grouping of their neighbours. Sometimes "local" will be a region or community within a large nation-state.'

While such a pragmatic approach seems to fit with the green tendency towards subsidiarity and local self-determination, it does not provide a strong vision that can either influence policy or be used as the basis for academic research and teaching. Bioregions frequently have fuzzy boundaries but they nonetheless offer two attractive features in terms of ecological-economic design: they are determined in response to ecological features; and they have great potential in terms of self-identification. Their potential for offering a different kind of basis for community and a provisioning system that is both energy-efficient and environmentally sensitive is not a new observation:

To maintain a large city requires immense quantities of coal and petroleum. By contrast, solar, wind and tidal energy can reach us mainly in small packets . . . To use solar, wind and tidal power effectively, the megalopolis must be decentralized. A new type of community, carefully tailored to the characteristics and resources of a region, must replace the sprawling urban belts that are emerging today. (Bookchin, 1971: 74-5).

However, it may be that the reason they have not been adopted more widely is that they are weakly defined and have for this reason failed to gain political and policy purchase.

The first conception of the bioregional economy, and one which led to trenchant critique, was that it resulted in an autarkic form of independence, that might also be considered xenophobic and self-centred. According to Barry, writing in 1990, 'the autarky imperative coupled with strict ecosystem dependence, implies that those living in resource-poor ecosystems are condemned to their fate as there is no provision for the redistribution of resources between bioregions'. Certoma (2009) is similarly critical of such attempts to create

a mythologised essentialism around the concept of 'local', and warns against a misplaced 'nostalgia' for a system of 'primeval relations between humans and nature'.

In response to this sort of critique, later writers have developed a more nuanced understanding of the local economy, arguing that self-sufficiency is in no way equivalent to a parochial and self-focused autarky. As Pepper (2007) argues, the radical environmentalist position finds itself engaged in an intractable tension with regard to its position on the global-local question, with many seeking a cultural openness that may not be compatible with the local identification that is argued to form a basis for environmentally sensitive living. The green vision attempts to escape this tension via a relationship between nations and regions is one of cultural openness and maximisation of exchange that can be achieved in a world of limited energy, within a framework of self-sufficiency in basic resources and the limiting of trade to those goods which are not indigenous due to reasons of climate or local speciality. The vision can be summarised in the phrases 'trade subsidiarity' combined with 'cultural diversity' (for further detail see Cato, 2009: chapter 9).

Accountability

The crisis of capitalism that occurred during 2008 has led to much criticism of the failure of responsibility and accountability in the late phase of this economic system. Whether this is criticism of bank regulation or the lack of respect shown by global corporations to workers in poorer countries and the global environment, the failure of responsibility on the part of businesses and the need for improved ethical standards by corporations and tighter regulation by governments have been much discussed. However, the issue of the appropriate scale for industrial and distributive activity within an economy has not been raised. Part of the source of irresponsible behaviour on the part of companies—whether banks, oil companies, or car manufacturers—can surely be explained by reference to the footloose behaviour that the

neoliberal capitalist regime has encouraged. This is in constrast to the strong local ties between entrepreneurs and their employees which typified the earlier phases of capitalism (Pike, 2006).

As I have argued elsewhere, this greater level of responsibility is likely to apply to environmental as well as social and ethical standards (Cato *et al*., 2007), and is part of the reason why Schumacher (1973) made famous the phrase 'small is beautiful' in connection with what he called 'appropriate scale' economic activity. It is also a reason why we might consider rehabilitating the phrase 'not in my backyard', since a bioregion is precisely our backyard, the area of the global economy for which its inhabitants are responsible. If every local community protects its own backyard, and especially if employees have ownership and control of the own workplaces through the expansion of worker co-operatives, then we can expect higher levels of social and environmental responsibility:

If we *could* implement the most efficient economic systems, their very scale of operations would make democratic accountability much more possible. Small is not always necessarily better, but increasingly the most resource-efficient and productive technologies tend to work on a human scale. . . The local scale allows direct accountability as well as general participation. (Milani, 2000: 187-8).

To illustrate this proposition we might consider the example of my local community farm, Stroud Community Agriculture. That is a small piece of land (49 acres or 19 hectares) in two parcels close to the market town of Stroud in Gloucestershire. At present we use the land to grow vegetables, but because it is farmed biodynamically we also need animal manure to improve soil fertility. We have to negotiate within the community of members and farmers how we share this land—if some members wish to eat meat there will be less land to grow vegetables for others. There are also climate-change impacts from such a decision. We

recently conducted an experiment with a working horse on the farm and learned that horses are far more intensive in their land use, although the additional manure was very useful. In a world without plentiful petroleum supplies we might also consider using some of our land to grow fuel crops, although this would mean sacrificing some of our food. This is, in microcosm, the sort of decision-making process that a bioregional provisioning system would require of us and it immediately becomes clear that accountability for the consequences of decisions taken is automatic.

Community

As is evident from the quotation from Barry cited earlier, community is a key aspect of the bioregional vision, and one which has significant implications for economic organization. The failure of community and the atomization of people as consumers rather than citizens has typified late 20th century life, as the market has replaced human relationships and more important aspects of human life have been commodified (Jackson, 2009). The bioregional economy will offer stronger human relationships, especially those based on a revival of skilled craft work (Sennett, 2008), together with the reclaiming of public space for citizenship and relationship. A typical example of the dominance of the market is the monopolization of public space by the supermarket and the shopping-mall. The French 'decroissance' or 'de-growth' movement argues for 'putting the economy back in its place' and reclaiming the public space for the citizen rather than the consumer. Advocates of degrowth seek to revive the traditions of community inherent in the Greek *agora* or Roman forum, where sociality and the transmission of news was as important as the exchange of goods: 'The *agora* is first and foremost a place of public life and civil society' (Fournier, 2007).

Within the bioregional community each person will, as has already been argued, need to have the skills to provide the products that are exchanged in the local market. This will

require not only a reskilling but also the growth of the multi-skilled citizen, who has been undermined and squeezed out of the labour-market during the past two hundred years of industrialization, fuelled by fossil energy sources that are rapidly being exhausted. Kropotkin argued for 'harmonised labour' which he viewed as just such diversity of occupation:

the greatest sum of well-being can be obtained when a variety of agricultural, industrial and intellectual pursuits are combined in each community; and that man shows his best when he is in a position to apply his usually varied capacities to several pursuits in the farm, the workshop, the factory, the study or the studio, instead of being riveted for life to one of these pursuits only. (Kropotkin, 1899/1994: 18).

The guild socialists and their inspiration William Morris, who had preceded Kropotkin, argued for the social and psychological benefits of craft work, and of the relationship between master and apprentice (Cole 1953-60). The Transition Movement similarly calls for a 'great upskilling' (Hopkins, 2008) and the potential for a reappraisal of the status value of different occupations (Cato, 2008) or even a 'rehabilitation of manual labour' (Fairlie, 2008) have been raised.

The concern over the 'broken' nature of modern society (Kirby, 2009) and the loss of community may be related to the loss of economic relationship as the distance between producers and consumers has grown. A bioregional economy, by contrast, would guarantee closer relationships—rather as farmers market do today (Norberg-Hodge, *et al*., 2002). We might once again become designated by our work (as so many of our surnames still attest) rather than our consumption and leisure behaviour. Although green economists are frequently criticised as merchants of the hair-shirt, there is evidence that those who seek their satisfaction non-materially are happier, benefiting from what Soper and Thomas (2006) call 'alternative hedonism'.

Conviviality

Of all the adjustments that a response to peak oil and climate change requires, the most challenging may be in terms of our identity and values as consumers. In the global supermarket, we are identified by our brand loyalties, which must be reinforced by frequent shopping expeditions (Smith, 2007). Thus the suggestion of the degrowth movement that we can have 'more fun' but 'less stuff' may be a challenging one for many modern consumers to swallow. A stronger community with deeper relationships and closer human ties is what the bioregional economy has to offer, to some extent to compensate for the intensity of consumption that climate change and diminishing supplies of fossil fuels make impossible. Conviviality is an expression of how this might affect our selves as ethical and spiritual beings, and how it affects our identity. The word was first used in the sense by Illich, who defined it as follows:

'I choose the term 'conviviality' to designate the opposite of industrial productivity. I intend it to mean autonomous and creative intercourse among persons, and the intercourse of persons with their environment; and this in contrast with the conditioned response of persons to the demands made upon them by others, and by a man-made environment. I consider conviviality to be individual freedom realized in personal interdependence and, as such, an intrinsic ethical value. I believe that, in any society, as conviviality is reduced below a certain level, no amount of industrial productivity can effectively satisfy the needs it creates among society's members.' (Illich, 1974).

As argued by North (2009), this conviviality, together with 'resilience and vibrancy' can provide a basis for livelihoods to replace a dependence on 'material goods and "growth" for its own sake.'

Perhaps we can imagine this rather more abstract benefit best in terms of the consumption of food, where the process of values-driven change is already apparent (Gregory

and Gregory, 2010). We are already beginning to see a shift from the supermarket to the famers' market and from global to local production. The concept of provenance is key to the less tangible benefits of this new form of consumption and describes the way that eating from our local soil and valuing local products enhances their non-material value (Morgan *et al*., 2006). A local example from Gloucestershire is the revival of orchards and the several hundred varieties of local apple that are now grown and celebrated there. My own town boasts the Lodgemore Non-Pareil and the county also has its own Old Spot pig variety and a particularly beautiful species of cattle. No doubt we can also think of similar examples of the value people derive from their local specialities, especially in France with its regional *produits du terroir*. I will never forget a meal I enjoyed during the Agen prune festival which managed to skilfully include dried plums in every course—including a delicious prune liqueur.

Making and sharing food is another custom that has declined but is likely to see a revival as fuel prices rise. As Figure 1 shows, almost a quarter of the petroleum associated with food consumption relates to preparation in the home, and the expansion of single-person households increases the amount of energy used to produce meals. Communal eating makes energy sense, as well as increasing conviviality: 'What has gone missing from it is the sense of the meal as a prepared, shared, convivial event having its own instrinsic value in structuring time, fostering human exchange, and providing food for thought as well as bodily renewal.' (Soper and Thomas, 2006). This conviviality and the stronger sense of identification with the local environment and its products is an important stage in re-embedding ourselves into the eco-system, as well as offering us a local identity to substitute for our global consumer identity. This may represent the beginning of the building of a new consumption ethic based more on social satisfaction and less on material satisfaction. In this article I am limited to offering 'the bioregion' as an organising concept for such an economy although, as

I indicate in the research agenda I sketch in the conclusion, this is an important area for further work.

--Figure 1 near here--

4. *A Prototype Bioregion: The Somerset Levels*

As described above, a bioregion can be identified by topographical features, watersheds, typical species, dominant crops and the crafts, products and cultures they give rise to. It is thus co-defined by ecological and human systems. In the UK context, the drained wetlands that make up the Somerset levels can be identified as a unique biome which might form the heart of a bioregion. The Somerset Levels and Moors is an area of 64,000 ha. lying to the South-West of Bristol and in the heart of the West Country of the UK. It is the most significant grass wetland in England, a coastal barrier of 'Levels' (marine clays lying on average only 6m. above sea level) and 'Moors' which can be as much as 6m. below peak tide levels and therefore prone to frequent flooding (Hume, 2008). The area is thus a specialised ecological system which has grown up in parallel with human communities.

It is an interesting example of an area that has been subject to human interventions for centuries; it was the use of a system of ditches (known locally as 'rhynes') that allowed the draining of the land for year-round agriculture. The typical species is the willow which has been harvested since the Bronze Age and is managed by pollarding—the harvesting of shoots. The pollarded willow is used for thatching spars, hurdles and firewood. Willow for basket-making is produced from the same species grown as a shrub and is known as 'withies' (many local towns have a 'withy's yard' where the crop was presumably sold). The craft dates back to the Celts and willow is used today to make hurdles, crab and lobster pots, eel-traps, coracles and baskets. Willow wood is also used to make cricket bats. The rush is a similarly versatile crop which has been harvested in the Somerset Levels since prehistoric times. The

true bulrush (*Scirpus lacustris* as opposed to the false bulrush or reedmace (*Typha lattifolia*) which is often mistaken for it) grows in water and is harvested in the summer, traditionally between the hay and corn harvests. Rush has a wide range of uses, including the seating of chairs and making of hats. (Bagias, 2003, provides a beautifully illustrated account of this region and its craftspeople.)

It should be clear from this discussion that the landform and landscape have associated species, which then determine the products and crafts which make up the traditional economy of a bioregion. Although today most baskets sold in the UK have been made in China, and even the fibres for thatching are often imported from there, within the past century Somerset was a centre of basket crafts, and much of the willow produced in the UK to residual craftspeople is still produced there. This is the heart of a bioregional approach to provisioning: an area whose climatic and geographical features support a particular natural and/or man-made product. This must be the key to an economy which is embedded within the ecosystem and whose people borrow for their needs from the local natural environment. It also inevitably led to craft specialisms, with experts in the making of baskets or chairs developing their own community of practice and sharing innovations in technique and materials.

--Table 1 near here--

Table 1 begins to link the different features of the Somerset Levels bioregion. The topographical and watershed features are very closely linked in this case, since the flat landscape gave rise to a unique wetland ecosystem, which then became home to particular water-loving species. In the case of plant species, these then led to traditional crafts, which are still present but largely for niche markets and as part of heritage tourism.

The discussion so far has focused on one very particular area of land and begun to sketch its ecological characteristics and the provisions and products in which this might give it a productive advantage. The guiding principle of the bioregional approach is that all basic

needs should be met from within the bioregion, hence it would make sense to draw the boundaries wide enough for this to be the case. While the assumption of a bioregional approach to economics is that local people would begin their consumption decisions by meeting their needs from what was available within their own bioregion (and devising a policy framework that might encourage this is part of the research agenda proposed later), this is not to suggest that trade is eliminated altogether.

Rethinking how trade might be arranged in a bioregional economic system is clearly beyond the scope of this paper, but it is worth noting that before the rise of systems of capitalist exchange, local areas had specialist market, like the well-known example of the Nottingham Goose Fair and of which the Conwy Honey Market (http://www.conwybeekeepers.org.uk/conwy_honey_fair.htm) is a vestige. As we reach the era of peak oil and the transport of goods by road becomes expensive we might also expect to see a return to our network of waterways as a means of goods transport. Since watersheds are important in the definition of ecological bioregions, we might expect that they would also play a part as natural communications networks.

Perhaps the most problematic question when rethinking our provisioning system to respond to the need to reduce CO_2 emissions is how we will meet the consumption needs of those who live in cities, which are human communities whose expansion was consequent upon fossil-fuelled industrialisation. The market towns that preceded them were precisely that: towns whose populations could be fed from the markets that sold produce grown in their hinterlands. Cities, by contrast, rely on huge national and international networks of supply. Herbert Girardet has calculated the environmental needs of the city of London and his figures are presented in Table 2. The figures make clear that London vastly over-consumes resources and could not provision itself if it used only the amount of land that represents its inhabitants' fair share of the global total. The ecological footprint of London alone is roughly equivalent

to 80 per cent of the land of the whole United Kingdom. A bioregional approach to provisioning clearly cannot resolve this problem, but it can seek to highlight the grossly unsustainable nature of provisioning in our cities, as well as their fragility in an era when transport networks are likely to be challenged by climate-related catastrophes.

--Table 2 near here--

5. *Conclusion: First Steps Towards a Research Agenda*

In this paper I haved used the concept of the bioregion as a heuristic device to help to structure thinking about the project of economic localisation. As an introductory paper it can do little more than argue for the relevance of the concept and sketch the beginnings of an agenda for future research. Although this paper originates from the discipline of economics, developing a bioregional economy is clearly an interdisciplinary project. I would suggest that some questions that may need to be answered include:[3]

- How might bioregionalism help us think about how to construct a more diverse economy of local economies more connected to the natural world?
- How large is an economic bioregion and should it have fixed boundaries?
- How would economic bioregions be defined—in terms of watersheds or other natural features?
- How does the way people think about their natural world affect their economies?
- What institutions might be appropriate in a bioregional economy and to what extent can we follow the model of the commons in managing shared resources?
- How has the advent of climate change altered perceptions of the security of access to basic resources?

Work has already begun to determine to what extent local areas of the country can provide for their population's needs for food, building on the work launched by Simon Fairlie (2008) and referred to earlier to attempt to assess the productive potential of the UK's land

(Macmillan and Cockcroft, 2008; Hopkins, Thurstain-Goodwin, and Fairlie, 2009). The impetus for this work is the sense of insecurity in supply chains, particularly in the face of potential disruption caused by climate change, or the depletion of oil supplies (Cato and Bickle, 2010). It is being driven by grassroots initiatives, but has now impacted on UK government thinking, as evidenced by the comment that 'existing patterns of food production are not fit for a low-carbon, more resource constrained-future' (Cabinet Office, 2008), a stark contrast to the statement just three years earlier that 'food security is neither necessary, nor is it desirable' (Defra, 2005).

While, as I have stressed throughout, defining the actual boundaries of a country's bioregions is not the most fundamental question to be addressed, it is important, and the contribution of geographers and especially economic geographers is clearly crucial. Mapping is a central task of developing and expanding the concept of a bioregional economy beginning with a process of bioregional mapping building on the Australian example already cited. Where the distinct bioregions of any country lie will depend on a host of local characteristics and making sense of these in terms of economic provisioning might provide a fruitful research agenda for economic geographers. We might also need to call on the skills of geographers for more innovative skills in metaphorical mapping of human relationships and their links with resources, as in Doreen Massey's work linking the slave trade to present-day London (see also Featherstone, 2003).

There is clearly also work for economists here—in providing fine-grained input-output analyses between existing bioregions; considering the energy consequences of the current lengthy supply chains of the globalised economy; and in projecting the shifts in fiscal revenues that a more locally based economy would bring about. While the application of the concept of a 'bioregion' to economic life is innovative, the work of some of the lost streams of economics could be used to support its development. The utopian socialist William Morris,

for example, proposed systems of local communities that were to be self-sufficient (Morton, 1973). Kropotkin in his *Fields, Factories and Workshops* makes a similar proposal for 'industrial villages' (1899/1994). Bioregionalists have lent support to a 'basic bioregional vision is of a patchwork of self-sufficient, small-scale, ecologically harmonious communities, organised according to their own normative standards' (Barry, 1990: 13) which have much in common with Kropotkin's 'small industries and industrial villages' (Kropotkin, 1899/1985).

Leopold Kohr and E. F. Schumacher were both concerned with the scale of political and economic organization, while the planners Patrick Geddes and Lewis Mumford, both pioneers of urban planning, have much to offer the development of a bioregional approach to economic life. A first step along the research path would require the reinclusion of such historical contributions, with their commitment to a firmer rooting and smaller scale for economic life. Planners might also address such questions as how urban environments and infrastructure can respond to local provisioning.

While this work is important, at this stage of our evolution bioregions are just as importantly about our identification. Here is a research agenda for social anthropologists: to map and analyse the cultural understandings about our place in space and following on from that, questions about how this affects our relationship with the natural world and their attitude towards local consumption. Perhaps the most interesting and important work, as I have argued above, falls into the domain of psychologists and sociologists, in theorizing and analyzing the changes in identity and relationship that can act as substitutes for increasing quantity of consumption, which a low-energy economy will not be able to provide. The first phase of research into climate change focused heavily on the biological and environmental sciences, but there is now more emphasis on the behavioural sciences, as responses to climate change are seen to require large-scale changes in behaviour (Burch and Robinson, 2007; Krause, 2009; Skea, 2009). As yet, however, there is little work on the psychological consequences of

the shift from a society where identity is derived primarily from consumption rather than production (Bauman, 2007) and what a more locally based provisioning system might offer in terms of an alternative basis for identity and community. If it is the case, as I suggest, that the peak-oil and climate-change crises portend a world with much smaller and closer-knit human communities, we will need the wisdom of social psychologists to suggest how this transition can be managed with the minimum of stress, and how the negative consequences of small-town life can best be contained and managed.

Finally, and perhaps most importantly, there is a major area of research into how policy-makers might enhance and support a move towards more localized systems of production. Hines (2000) began this process with his proposals for 'site here to sell here' and intra-national as well as international import and export duties. His ideas (which have been taken up by Woodin and Lucas (2004), amongst others), offer a vision of a political manifesto that might shift the power away from the corporations that have thrived in the post-globalization world. There is also scope for exploring the policy support that might be offered to grassroots initiatives to reconnect local producers and consumers.

It is difficult for us to imagine what it would mean to, in the bioregional slogan, 'live a rooted life' because, at least in the UK, since the introduction of the feudal system in 1066 and especially since the enclosure of common land in the 17th and 18th centuries (Neeson, 1989) there has been an ongoing process of dislocation of people from the land (see also McIntosh, 2001). Thus while a significant part of the research agenda for bioregional economics will be concerned with mapping our existing bioregions and assessing which resources each might most usefully provide in surplus to others, an equally important strand of research should be concerned with considering the social and cultural implications of an economy which is re-embedded in the environment in the way that bioregionalism proposes.

The initial reaction to a suggestion that we need to become bioregionally self-sufficient in terms of provision for our basic needs can be shocking:

'I can understand that there may be residual fears that a bioregional economy based on stability and conservation would mean terrible deprivation, a loss of all our material gains, a reversion to some kind of hand-to-mouth existence where we'd all be living in caves and plucking berries.' (Sale, 2000: 71).[4]

This shock must be confronted, since the scientific data emerging from Copenhagen and other international conferences implies the need for massive reductions in CO2 emissions, meaning that we have little choice about accepting significant and urgent changes in our consumption behaviour. Of course, there are human communities across the global whose way of life is still deeply embedded in their local environment and is not threatening to the planetary ecosystem. This may be considered a prototype of 'bioregional living' and may provide guidance on the journey that more complex and higher-energy societies need to make. Such communities live without many of the benefits of industrial society, although they may be better adapted to 'flourishing within limits' (Jackson, 2009), and in this regard their experience may provide knowledge that will be useful on our journey. However, a bioregional economy does not imply a return to this standard of living, nor that we need to unlearn the knowledge that two centuries of science and technology have brought us. We may, rather, see these as the fruits of the fossil-fuel orgy which will remain with us, as tools for developing an embedded and sustainable economy.

On a global scale we need to learn how to live within nature's limits, a process whose conceptualisation has been assisted by the idea of the 'ecological footprint'. The bioregional economy combines the footprint with the backyard, by ensuring that we stick within the limits of our own patch of the earth, which is what our bioregion represents. At present, those of us who live in the wealthy, western societies are metaphorically 'renting' land to produce our

food and also renting planetary space to absorb our wastes. If we shifted to the bioregional perspective then resources and wastes would originate from and remain within the bioregion, thus enforcing a much higher level of planetary accountability. On the other hand, the bioregional economy offers much that may act as a substitute for an economy which, while it has offered much materially to those of us in the affluent economies of the West, has bought this at a large cost to the poor nations and the planet itself, and has also increasingly neglected our deeper, spiritual needs.

Notes

1. The map is available online here:

http://www.environment.gov.au/parks/nrs/science/pubs/map9.pdf

2. The distinction between 'self-suffiency' and 'self-reliance' is an important one. The former suggests a desire to provide for all of one's own needs and to deny those needs that cannot be met from local resources or by the effort of the local community. By contrast, 'self-reliance' implies a provisioning strategy that adapts needs to local availability and prioritises local production, but does not entirely abjure the need for imports and exports.

3. Thanks to Pete North for contributing to the thinking behind these questions.

4. It should be noted that this apparently perjorative attitude towards the hunter-gatherer lifestyle is not shared by the author, although it may well dominate responses to this sort of proposal by the cultural elites.

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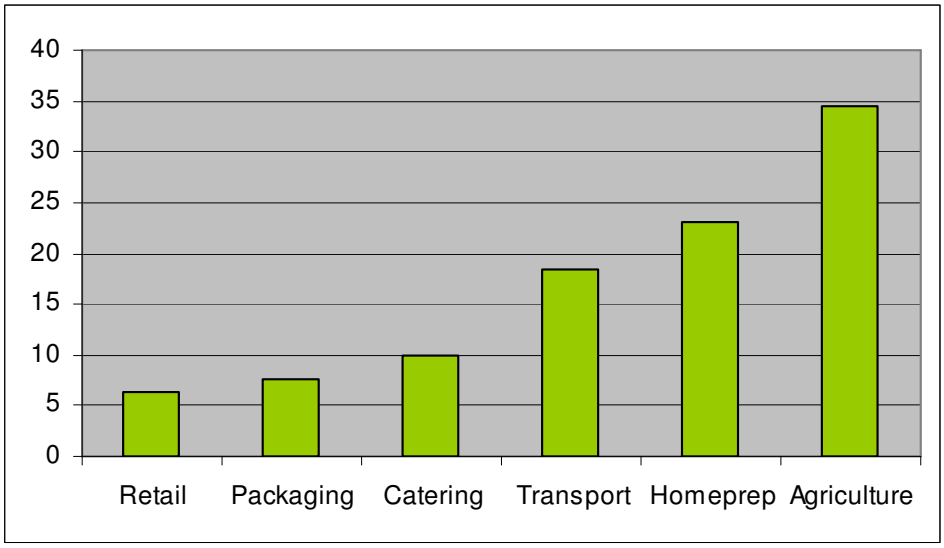
Figure 1. Percentages of Petroleum Used in the Food Production and Distribution System



Source: Lucas, Jones, and Hines (2006), *Fuelling a Food Crisis*

Table 1. Typical features of the Somerset Levels bioregion

Characteristic	Expression	Comment
Topography	Low-lying moorland surrounded by two ranges of hills	Poor arable land—mainly used for grazing
Watershed	Floodplains of the Severn, Parrett, Axe and Brue	Reclaimed wetland still at risk of flooding
Plant species	Water-loving trees such as willow and alder, and plants such as rush and reed	*Salix* thrive in moist habitats and are fast-growing (three years to harvest)
Animal species	Wetland birds such as heron, crane, egret, bittern, snipe, lapwing and predator species; otter, marsh frogs	Drained wetland provided grazing for cows, hence dairy industry and land for orchards
Crafts	Basket-making, rush-seating	Now residual due to global trade and lower wage-rates in producer countries
Products	Willow and rushwork products, cider, cheese	Skills being lost; production for tourists
Culture	Distinct Zummerzet dialect/accent	Now spoken mainly by the elderly
Festivals	Wassailing (a pagan festival to ensure good apple harvest); scything festival	Obsolete or extinct festivals like these are now enjoying a revival

Table 2. London's land demand by different use categories

Population	7 million
Surface area	158,000 ha.
Area required for food production	8.4m. ha.
Forest area required	768,000 ha.
Land area for carbon sequestration	10.5m. ha.
Total footprint	19.7m. ha, 125 times surface area
Britain's surface area	24.4m. ha.

Source: Girardet, 2006.