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Big Society ~ *securing the future*

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ABSTRACT
The premise of the "Big Society" programme is to re-distribute "*power*" from a centralised, Big Government hub (Westminster) to "*the people*". The intention is to deliver "*government and its services*" at a more local level. This paper will explore various dimensions to illustrate the opportunities for sustainable development and the risks if the shift of "*power*" is superficial.

To do this, the paper will look briefly at the really big issues (climate change, ocean acidification, stratospheric ozone, biogeochemical nitrogen and phosphorus cycle, global freshwater use, land system change, biodiversity loss, chemical pollution and atmospheric aerosol loading). On a planet-wide scale, these issues (the Bigger Picture) could destabilise critical biophysical systems and trigger abrupt or irreversible environmental and social changes that would be deleterious or even catastrophic at a Big Society level. Yet they can only be dealt with by Big Government.

The current assumptions that underpin the Big Society shift appear blithely ignorant of this Bigger Picture. The paper will then consider the global socio-political landscape within which the Bigger Picture will need to be addressed. This then, provides the backdrop for considering the Big Society shift itself ~ its opportunities and risks.

The Bigger Picture

1. It is believed that the outcomes of man-made activities have now affected planet-scale processes to such an extent that abrupt global change could now be reasonably anticipated. Limits to such processes really define the degree to which humanity is able to continue safely. Exceeding one or more of these planet-wide limits could be catastrophic triggering non-linear, abrupt change[1].

2. Nine planet-scale limitations are already evident relating to:

   - climate change
   - ocean acidification
   - stratospheric ozone depletion
   - global phosphorus and nitrogen cycles
   - biodiversity loss
   - global freshwater use
   - land-system change
   - aerosol loading
   - chemical pollution

3. Limits relating to climate change, biodiversity loss, and the global nitrogen cycle may already be exceeded. It is likely that planet-wide limits are interdependent and exceeding one or more may have implications for others. The social impacts of exceeding theses limits will reflect the robustness of social–ecological resiliencies. Currently, there are uncertainties and knowledge gaps concerning these limits. What is clear is that our traditional perspective of governance will need to reflect a non-sectoral basis. In other words, we cannot look at these limits in isolation of one another. We need to look at the integrated landscape (the Bigger Picture) and only governments and inter-governmental alignments can do that.

4. Humanity constitutes the biggest driver of change to planet-wide systems[2]. An important reason for this is that our prevailing concern for economic development appears not to appreciate the risk of human-

[1] *Planetary boundaries: exploring the safe operating space for humanity. Ecology and Society **14**(2): 32: http://www.ecologyandsociety.org/vol14/iss2/art32/*
[2] *Defined as the integrated biophysical and socioeconomic processes and interactions in both spatial (local to global) and temporal scales, which determine the state of the planet*

induced changes, at a planet-wide scale. Comprehension at planet-wide scale reflects, typically, the ability (inability) of the individual human capacity to influence.

5. The current interglacial period that began about 10 000 years ago, allowed agriculture and complex human societies, including ours, to develop. For the first time, we did not have to be pre-occupied with mere survival. We began to invest in natural resources and have now become dependent upon those for our way of life, our organised societies, our technologies, and our economies.

6. Until recently, the Earth's natural and mineral resources were able to accommodate humanities' activities. That accommodation has changed since the industrial revolution. We had our warning about stratospheric ozone some years ago and we are having our climate change one now. The growing human population is now challenging the threshold of other aspects of the Earth's resilience[3].

7. Some human activities such as land-use are not especially operating at the global scale though continual decline of key ecological functions such as carbon sequestration may be implicit in collapses which may generate feedbacks that trigger or increase the likelihood of some other global limits being breached e.g. in climate change. Some local processes may trigger change as in lakes, forests and savannas through the misuse of land, water, and nutrient loading. These could of course become a global concern if manifested across the planet.

8. There is, of course, considerable uncertainty in knowing the planet-scale limits due to the intrinsic uncertainty of how these complex systems may behave. In essence, we could envisage the limits for Earth-scale processes to be independent of humanities' preferences, values, political compromises or socio economic justifications. Work is clearly needed to determine the future shape of humanities activities in order to stay within limits at an Earth scale.

9. There is ample evidence from local to regional-scale that ecosystems (such as lakes, forests, and coral reefs etc) are experiencing gradual changes (through biodiversity harvesting, soil [mis-] management, freshwater abstraction, nutrient cycles and so on) that could trigger abrupt changes when critical limits have been breached.

10. Many planet-wide processes (such as climate change) produce impacts at a more regional scale. For example, climate change is associated with various "tipping points" (e.g., the Indian monsoon and El Niño events) which all show varying degrees of sensitivity to a global change e.g. temperature rise. The inter-governmental response to that is to try to propose a planet-wide limit e.g. the famous "2 degrees[4]".

Climate Change

11. The climate-change limit has been under vigorous discussion during Copenhagen, and there was a growing political convergence towards "2°C", a year later, at Cancún. Interestingly, while negotiators were content with this outcome, there was an Expert Meeting convened in Oxford by the UK Meteorological Office to plan for a 4°C world. It is the difference between political and technological perspectives of the Bigger Picture.

Ocean Acidification

12. Ocean acidification poses a challenge to marine biodiversity and the ability of oceans to continue to function as a sink for CO_2 (currently removing perhaps 25% of man-made emissions). The atmospheric removal process includes both dissolution of CO_2 into seawater and the uptake of carbon by marine organisms. The ocean absorption of anthropogenic CO_2 is not evenly-distributed. Addition of CO_2 to the oceans increases the acidity of the surface seawater. Many marine-organisms are very sensitive to changes in ocean CO_2 chemistry, especially those that use carbonate ions dissolved in the seawater to form protective calcium carbonate shells or skeletal structures. Surface ocean pH has decreased by about 0.1 pH unit (corresponding to a 30% increase in hydrogen ion concentration and a 16% decline in carbonate concentrations) since pre-industrial times. This rate of acidification is at least 100 times faster than at any other time in the last 20 million years. By the year 2200, under a business-as-usual scenario for fossil-fuel consumption, the reduction in seawater pH and phytoplankton could induce a large reduction in the export of marine organic matter from coastal waters leading to considerable expansion of hypoxic zones. Ocean acidification may have serious impacts on coral reefs and associated ecosystems presumably with ripple effects through the food chain.

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[3] The ability to persist (absorb and resist shocks) adapt, and transform in the face of natural and human-induced disturbances
[4] The rise in global mean temperature should be no more than 2°C above the pre-industrial level

Stratospheric Ozone Depletion

13. Stratospheric ozone filters ultraviolet radiation from the sun. The appearance of the Antarctic ozone hole was a textbook example of a limit being breached. A combination of increased concentrations of anthropogenic ozone-depleting substances (such as chlorofluorocarbons) and polar stratospheric clouds moved the Antarctic stratosphere into a new regime: one in which ozone effectively disappeared in the lower stratosphere in the region during the Austral spring. This thinning of the Austral polar-stratospheric ozone layer has negative impacts on marine organisms and poses risks to human health. To date, the Montreal Protocol (and its subsequent amendments) allowed humanity to pull back from the limit ~ a consequence of a relatively, low cost, easy techno-fix, combined with (of paramount importance) a zero effect on national development. Contrast that with climate change mitigation requirements.

Global Phosphorus and Nitrogen Cycles

14. Local to regional-scale anthropogenic interference with the nitrogen cycle and phosphorus flows has induced abrupt shifts in lakes and marine ecosystems (e.g. anoxia in the Baltic Sea). Eutrophication due to human-induced influxes of nitrogen (N) and phosphorus (P) is able to push aquatic and marine systems across thresholds, generating abrupt change. Human-induced degradation of ecosystem states (e.g. overfishing, land degradation) and increase in N and P flows at regional to global scales may cause undesired change in terrestrial, aquatic, and marine systems, while simultaneously functioning as a slow driver influencing anthropogenic climate change at the planet scale.

15. Human activities now convert more N from the atmosphere into reactive forms than the Earth's entire terrestrial processes combined (industrial fixation of atmospheric N to ammonia, agricultural fixation of atmospheric N via cultivation of leguminous crops, fossil-fuel combustion and biomass burning). Although the primary purpose of most of this activity is to enhance agricultural production via soil fertilisation, much reactive N eventually ends up in the environment—polluting waterways and coastal zones, adding to the local and global pollution burden, and accumulating in the biosphere. Efforts to limit N pollution have, to date, been undertaken at local and regional scales only — e.g. by limiting concentrations of nitrate in groundwater or emission of nitric oxides to urban air-sheds.

16. Although N forms part of a biological global cycle, P is a finite fossil mineral mined for human use and added naturally into the Earth System through geological weathering processes. The crossing of a critical threshold of P inflow to the oceans has been suggested as the key driver behind global-scale ocean anoxic events potentially explaining past mass extinctions of marine life.

Biodiversity Loss

17. Local and regional biodiversity changes can have pervasive effects on Earth ecosystem functioning and may interact with several other planet-wide limits. For example, loss of biodiversity can increase the vulnerability of terrestrial and aquatic ecosystems to changes in climate and ocean acidity, thus reducing the safe limits for these processes. The current and projected rates of biodiversity loss constitute the sixth major extinction event in the history of life on Earth—the first to be driven specifically by the impacts of human activities. Previous extinction events, such as the Tertiary extinction of the dinosaurs and the rise of mammals, caused massive permanent changes in the biotic composition and functioning of Earth's ecosystems.

18. Current accelerated biodiversity loss is particularly serious, given growing evidence of the importance of biodiversity for sustaining ecosystem functioning and services and for preventing ecosystems from tipping into undesired states. Species play different roles in ecosystems, and species loss, therefore, affects both the functioning of ecosystems and their potential to respond and adapt to changes in physical and biotic conditions. Currently, the global extinction rate far exceeds the rate of speciation, and consequently, loss of species is the primary driver of changes in global biodiversity. The average extinction rate for marine organisms in the fossil record is 0.1 to 1 extinctions per million species-years extinction rates of mammals in the fossil record also fall within this range.

19. Accelerated species loss is increasingly likely to compromise the biotic capacity of ecosystems to sustain their current functioning under novel environmental and biotic circumstances. Since industrial times, the rate of species extinction is 100–1000 times the background rates that were typical over Earth's history. This has resulted in a current global average extinction rate of 100 extinctions per million species-years. The average global extinction rate is projected to increase to 1000 extinctions per million species-years during this century. Simply put, about 25% of species in well-studied taxonomic groups are threatened with extinction. Until recently, most extinctions since 1500, occurred on oceanic islands. During the last 20 years, however, about half of the recorded extinctions have occurred on continents, primarily due to

land-use change, species introductions and, increasingly, climate change, suggesting that biodiversity is now broadly at risk throughout the planet.

Global Freshwater Use

20. Humanity is the dominant driving force altering global-scale river flow and the spatial patterns and seasonal timing of vapour flows. An estimated 25% of the world's river basins run dry before reaching the oceans due to use of freshwater resources in the basins. Global manipulations of the freshwater cycle affect biodiversity, food, and health security and ecological functioning, such as provision of habitats for fish recruitment, carbon sequestration, and climate regulation, undermining the resilience of terrestrial and aquatic ecosystems. Threats to human livelihoods due to deterioration of global water resources include; the loss of soil moisture resources (green water) due to land degradation and deforestation, threatening terrestrial biomass production and sequestration of carbon; use and shifts in runoff (blue water) volumes and patterns threatening human water supply and aquatic water needs; and, impacts on climate regulation due to decline in moisture feedback of vapour flows (green water flows) affecting local and regional precipitation patterns.

21. Estimates indicate that 90% of global green water flows are required to sustain critical ecosystem services, whereas 20% – 50% of the mean annual blue water flows in river basins are required to sustain aquatic ecosystem functioning. Water-induced thresholds at the continental or planet-wide scale may be exceeded as a result of impacts at local (e.g., river basin) or regional (e.g., monsoon system) scales caused both by changes in water resource use and climate change-induced shifts in the hydrological cycle.

22. Green water flows influence, at the regional scale, rainfall levels through moisture feedback and, thereby, the availability of blue water resources. Green water-induced thresholds include collapse of biological sub-systems as a result of regional drying processes. Examples include the abrupt change from a wet to a dry stable state in the Sahel region approximately 5000–6000 years ago and the future risk of a rapid savannisation of the Amazon rainforest due to abrupt decline in moisture feedback. Blue water-induced thresholds include collapse of riverine habitats if minimum environmental water flow thresholds are crossed and the collapse of regional lake systems (such as the Aral Sea).

23. A planet-wide limit for freshwater resources must thus be set to safely sustain enough green waterflows for moisture feedback (to regenerate precipitation), allow for the provisioning of terrestrial ecosystem functioning and services (e.g. carbon sequestration, biomass growth, food production, and biological diversity), and secure the availability of blue water resources for aquatic ecosystems.

24. However, the pressure on global freshwater resources is growing rapidly, mainly due to increasing food demands. Green water use in rainfed agriculture may have to increase by 50% by 2030 to ensure food security whereas consumptive blue water use for irrigation may increase by 25%–50%. The remaining safe operating space for water may be largely committed already to cover necessary human water demands in the future.

Land-System Change

25. Land-system change, driven primarily by agricultural expansion and intensification, contributes to global environmental change, with the risk of undermining human well-being and long-term sustainability. Conversion of forests and other ecosystems to agricultural land has occurred at an average rate of 0.8% per year during the past 40–50 years and is the major global driver behind loss of ecosystem functioning and services. Humanity may be reaching a point where further agricultural land expansion at a global scale may seriously threaten biodiversity and undermine regulatory capacities of the Earth system (by affecting the climate system and the hydrological cycle).

26. For humanity to stay within this limit, croplands should be allocated to the most productive areas, and processes that lead to the loss of productive land, such as land degradation, loss of irrigation water, and competition with land uses such as urban development or biofuel production, should be controlled. Demand-side processes may also need to be managed; these include diet, per capita food consumption, population size, and wastage in the food distribution chain. Agricultural systems that better mimic natural processes (e.g., complex agro-ecosystems) could also allow an extension of this limit.

27. Although the effects of land-system change act as a slow variable that influences other boundaries, such as biodiversity, water, and climate, they may also trigger rapid changes at the continental scale when land-cover thresholds are crossed. For example, conversion of the Amazon rainforest into cultivated or grazing systems may reach a level where an additional small amount of conversion would tip the basin into an irreversible transformation to a semi-arid savanna. At the global scale, if enough high-

productivity land is lost to degradation, biofuel production, or urbanisation, food production may spread into marginal lands with lower yields and a higher risk of degradation.

Aerosol Loading

28. Human activities since the pre-industrial era have doubled the global concentration of most aerosols influencing the Earth's radiation balance directly by scattering incoming radiation back to space, or indirectly by influencing cloud reflectivity and persistence. Aerosols can also influence the hydrological cycle by altering the mechanisms that form precipitation in clouds. Aerosols may have a substantial influence on the Asian monsoon circulation absorbing aerosols over the Indo-Gangetic plain near the foothills of the Himalayas act as an extra heat source, enhancing the incipient monsoon circulation. The same aerosols lead to a surface cooling over central India, shifting rainfall to the Himalayan region. This "elevated heat pump" causes the monsoon rain to begin earlier in May–June in northern India and the southern Tibetan plateau, increases monsoon rainfall over all of Indian July–August, and reduces rainfall over the Indian Ocean.

29. From the perspective of human-health effects, fine particulate air pollution ($PM_{2.5}$) is responsible for about 3% of adult cardiopulmonary disease mortality, about 5% of tracheal, bronchial, and lung cancer mortality, and about 1% mortality from acute respiratory infection in children in urban areas worldwide. The same aerosol components (e.g., particulates, tropospheric ozone, oxides of sulphur and nitrogen) lead to other deleterious effects. Crop damage from exposure to ozone, forest degradation and loss of freshwater fish due to acidic precipitation, changes in global precipitation patterns and in energy balance are further examples of indirect effects air pollution on the well-being of humanity.

Chemical Pollution

30. Primary types of chemical pollution include radioactive compounds, heavy metals, and a wide range of organic compounds of human origin. Chemical pollution adversely affects human and ecosystem health, which has most clearly been observed at local and regional scales but is now evident at the global scale. Key effects are a global impact on the physiological development and demography of humans and other organisms with ultimate impacts on ecosystem functioning and structure and by acting as a slow variable that affects other planetary boundaries. For example, chemical pollution may influence the biodiversity limit by reducing the abundance of species and potentially increasing organisms' vulnerability to other stresses such as climate change. Chemical pollution interacts with the climate-change limit through the release and global spread of mercury from coal burning and also reflects industrial chemicals that are currently produced from petroleum, releasing CO_2 when they are degraded or incinerated as waste.

31. Although most efforts to reduce chemical pollution have focused on local and regional scales, the 2001 UN Stockholm Convention on Persistent Organic Pollutants (POPs) implicitly recognised that global concentrations of a few specific POPs (e.g., PCB, dioxins, DDT, and several other pesticides) have crossed an, as yet unquantified, planet-wide limit.

32. Interactions among planet-wide limits may shift the safe level of one or several boundaries. In reality, what may appear as a physical limit with a clearly defined threshold may change position as a slowly changing variable (without known global thresholds), such as the rate of biodiversity loss, exceeds its boundary level. At the aggregate level, desiccation of land due to water scarcity induced by transgressing the climate limit, for example, may cause such a large loss of available land for agricultural purposes that the land limit also shifts downward. At the regional scale, deforestation in the Amazon in a changing climate regime may reduce water resource availability in Asia highlighting the sensitivity of the water limit to changes in the land-use and climate-change limits.

33. Tropical forests are a key component of both the regional and global energy balances and hydrological cycles. In the Amazon basin, a significant amount of the water in the atmosphere is recycled through the vegetation. In addition, the forest produces aerosol particles that can form cloud droplets. Changing particle concentration influences how likely the clouds are to produce rain and the strength of the convective circulation. Deforestation and biomass burning associated with land-use practices have changed convection and precipitation over the Amazon basin. These changes in precipitation complete a feedback loop, because the availability of water influences the amount and kind of aerosol particles that the vegetation emits. Such interacting processes driven by change in land use and climate could reach a tipping point where the Amazon forest is replaced by savanna-like vegetation by the end of this century.

34. This feedback loop is not limited to regional effects; it can also influence surface temperatures as faraway as Tibet. Model simulations predict that large-scale deforestation in the northern Amazon would drastically change the surface energy balance, leading to a weakening of deep convection. This, in turn, would drive a weakening and northward shift in the Inter-Tropical Convergence Zone, which causes

changes in the jet stream that directs the trajectory of mid-latitude weather systems, ultimately influencing surface temperature and precipitation in Tibet.

35. Changes in climatic conditions in Tibet directly affect much of Asia's water resources. The 15 000 glaciers in the Himalaya-Hindu Kush region store an estimated 12 000 km^3 of freshwater, which is a main source of freshwater for roughly 500 million people in the region, plus an additional 250 million people in China. Glacier melting, initially causing short-term increases in runoff, leads to increased flood risks, seasonal shifts in water supply, and increasing variability in precipitation. Although the calculated land-cover changes discussed here are extreme, the results illustrate that changes in the global climate system driven by land-use change in one region can affect water resources in other parts of the planet.

36. The preliminary analysis suggests that humanity has already transgressed three limits (climate change, the rate of biodiversity loss, and the rate of interference with the nitrogen cycle). There is significant uncertainty surrounding the duration over which limits can be transgressed before causing unacceptable environmental change and before triggering feedbacks that may result in crossing of thresholds that drastically reduce the ability to return within safe levels. Fast feedbacks (e.g., loss of Arctic sea ice) appear to already have kicked-in after having transgressed the climate limit for a couple of decades. Slow feedbacks (e.g., loss of land-based polar ice sheets) operate over longer time frames. Despite the phasing-out of CFC emissions and the fact that the ozone holes did not spread beyond the polar vortex regions, which remained largely intact, the ozone holes over the polar region will only slowly decline over the next half century.

37. There is little doubt, however, that the complexities of interconnected slow and fast processes and feedbacks in the Earth System provide humanity with a challenging paradox. On the one hand, these dynamics underpin the resilience that enables planet Earth to stay within a state conducive to human development. On the other hand, they lull us into a false sense of security because incremental change can lead to the unexpected crossing of thresholds that drive the Earth System, or significant subsystems, abruptly into states deleterious or even catastrophic to human well-being. The concept of planet-wide limits provides a framework for humanity to operate within this paradox.

38. Any one of the planet-wide limits would be a problem for Big Society. Big Society can only act at local level. The really big issues need governmental intervention. But, climate change is anything to go by then government may not be able to act soon enough, or even at all. For instance, the North Sea cod fishery has been a challenge for decades ~ it is not a technical problem it is a political challenge, and judging by past decades, insuperable.

39. The prognosis for the only players in this Bigger Picture, government, taking on climate change, ocean acidification, stratospheric ozone, nitrogen and phosphorus cycles, global freshwater use, land-system change, biodiversity loss, aerosol loading, or chemical pollution does not look promising.

40. So that means it will be down to Big Society, not to solve any of those challenges but to adapt. The real potential value of Big Society (though not the initial inspiration for it) will be to provide the platform for local adaptation. The risk is that the existing local delivery mechanism (the local authority) is simply not up to it.

The Global Socio-Political Landscape

41. There is a critical backdrop to the context of Big Government and Big Society that must be taken into account. Within the next twenty years, a world could be foreseen that consists of three essential dynamics:

- A globalising area (E Europe, North America, Oceania, NE Asia, India, SE Asia, C America) about half the world with a growing middle class;
- A stagnating area (Middle East, Africa, S Asia) about a third of world population with low incomes, economic regression, and controlled by unpopular and harsh governance systems; and,
- A declining area (European Union and South America) with less than 10% of the world population yet a quarter of the wealth.

42. World economic power is likely to be concentrated around the Pacific Ocean. The growing middle class in China and India means the emergence of a large, well-educated work force at a relative low cost with a huge thirst for the world's base resources. The European Union will continue to import poorer migrants

and export its professionals (particularly its scientists and engineers) and will endure the main shock of this evolution, with its middle class suffering the most.

43. Based on updated projections[5] the world population will attain 8.2 billion in 2030. The ten most populated countries/areas in 2004 and a projection for 2030, representing about 2/3rd of the world's population, are/were (in millions)[6]:

2004		2030	
China (1,315)	Brazil (186)	India (1,449)	Pakistan (262)
India (1,103)	Pakistan (157)	China (1,346)	Brazil (235)
EU (470)	Russia (143)	EU* (605)	Nigeria (217)
USA (298)	Bangladesh (141)	USA (360)	Bangladesh (205)
Indonesia (222)	Nigeria (131)	Indonesia (270)	Ethiopia (136)

** assumes enlargement to Balkans and Turkey*

44. Three relevant consequences may be inferred:

- Net population increase will exclusively occur in newly-industrialising countries such as India and Malaysia and in the agrarian economies of sub Saharan Africa; potentially retaining their resources or retaining their "export", for home markets;

- Sub Saharan Africa will have a higher growth than any other region, with potential mass exoduses from land made marginal due to climate change. This will have two main effects; action based on an unsubstantiated belief that an escape to western Europe (via the southernmost countries (Spain, France and Italy) is a solution to a desperate situation; triggering unprecedented levels of mass entries potentially overwhelming the southerly border controls of western Europe; and, an increasingly autocratic response in many African countries to rural exoduses into the swelling urban areas which will precipitate further additions to the "escape" to Europe; and,

- Thirdly, we will see more and more countries, unable to secure food for their populations, leasing land from other countries (particularly from those that have control over their people and importantly, their land). Already we see Qatar dealing with Kenya to lease 40,000 hectares of land to grow crops. In Kenya fertile land is unequally distributed. Several prominent political families own huge tracts of farmland, while millions of people live in densely-packed slums. The country is also experiencing a food crisis, with the government forced to introduce subsidies and price controls on maize after poor production and planning caused the price of the staple "ugali" flour to double in less than a year. Qatar, which has large oil and gas revenues, imports most of its food, as most of its land is barren desert with just 1% suitable for arable farming. Saudi Arabia and the United Arab Emirates have also been negotiating leases of large tracts of farmland in countries such as Sudan and Senegal. Deals are already in place to grow rice in Cambodia, maize and wheat in Sudan and vegetables in Vietnam; much of the produce will be exported to the Gulf. South Korea has a lease in Madagascar to grow crops on 1.3 million ha of land.

45. The sudden rush by foreign governments and companies to secure food supplies in Africa has some experts worried. Jacques Diouf[7] recently spoke of the risk of a "neo-colonial" agricultural system emerging. The FAO said some of the first overseas projects by Gulf companies in Sudan, where more than 5 million people receive international food aid, showed limited local benefits, with much of the specialist labour and farming inputs being imported. Some food imports are already being paid for in arms shipments, which cannot be good.

46. Potentially, all nations will shift towards a fertility rate of about 2.1 children per woman (replacement level) a rate at which, historically, people tend to focus on well being, use of contraceptives and gender equality (a facsimile for a developing middle class). However, the fall in fertility rates may be faster in some countries (notably in the EU) and much slower in many other countries.

47. The expected decline of the European population would only be an adjustment, compared to the rapid growth occurring in the past, and may be welcome: less population could allow a better living and less pollution. In practice, migration may be used (as historically) to solve the problem of a declining work

[5] *of the United Nations (Medium Growth Scenario, 2004)*
[6] www.freeworldacademy.com
[7] *Director General of the UN Food and Agricultural Organisation*

force in Europe, in order to support an increasingly longer-lived population that is straining health and welfare services.

48. The increase of population in poorer countries is not necessarily helpful; for instance, UNICEF [8] reported in 2003 that more than 1 billion children were suffering from basic needs; clean water, sanitation, good nutrition, and education. One billion children means about 500 millions girls, living mostly in sub Saharan Africa and the Middle East (with high fertility rate) and with each girl having an average of three children before 2030. This means that the expected increase of the population (1.7 billion) will mainly come from these mothers who have been deprived of good nutrition, education, health and so on. This increase of population in poorer countries will result in other consequences: more deforestation, with rainforests in SE Asia and Central Africa being seriously damaged by 2030 with irreversible consequences for the climate. The availability of water will be also a serious threat in the entire North Africa and Middle East, as well as in Central Asia.

49. The general picture above may be further complicated by future, unpredictable regional shortages in food, water, and energy, and the effect of pandemics, natural catastrophes, wars and continual low-level armed conflict.

50. With world economic power being concentrated around the Pacific Ocean: that could represent two thirds of the world global national income with the following characteristics:

- USA and Canada the same as in 2004;
- China and the newly reunited Korea growing by a third;
- The area dominated by authoritarian governance systems may only have a few percent of the world's global national income, yet host a third of the world population; and,
- The European Union share falling from a third, despite enlargement to the Balkans and Turkey.

Thus, the fifteen major economic powers* are/or will be (in £ Billion)[9]:

2004		2030	
USA: 7, 594	Spain: 550	USA: 16,250	Russia: 1.384
Japan: 2, 968	Mexico: 437	China: 11,250	Canada: 1,218
Germany: 1,556	India: 425	Japan: 4,639	Italy: 1,172
China: 1,131	Korea: 418	India: 2,975	Spain 968
UK: 1, 262	Brazil: 344	UK: 2,075	Mexico 950
France: 1,162	Australia: 338	Germany: 1,937	Australia: 937
Italy: 937	Netherlands: 322	Korea 1,937	Brazil: 743
Canada: 562		France 1,562	

**** representing about 80% of global national income yet hosting little more than half of the world population***

At first glance, the major economic powers will not change too much: The USA will remain the first economic power. Only one country, Russia, will enter the group. On the other hand, the ranking differs with China, India and Korea outpacing most of the European countries. In 2030, a third of the world population will be on an income that exceeds £6,250 per capita (16% in 2004) with a huge consumerist thirst.

51. The most important fact is that the growing middle class will represent two thirds of the world population in 2030 (25% in 2004). For example, China and India's middle class will sharply increase (650 million expected in China by 2030). In turn, this larger middle class will mean a consumption explosion and with corresponding pressure on all known resources, constraining the supply to Europe.

52. As a result, the percentage of poor people will decrease from 75% to under a half and will concentrate in South Asia (except India) and in Africa (except South Africa). Large segments of the world population will endure a greater poverty than in 2004. For example, the situation in Sub Saharan Africa will be catastrophic with the world global national income per capita (already a tiny £ 222 in 2004) dropping a further 20% promoting mass exodus to urban areas in search of work and causing massive social unrest

[8] http://www.unicef.org/media/media_15082.html
[9] www.freeworldacademy.com

(which will be ruthlessly suppressed) and environmental pollution, as the already poorly maintained and barely functioning water and sewerage systems struggle to cope and collapse.

53. There are some uncertainties; the effect of future pandemics, a future Israeli strike against Iran triggering further de-stabilising of the Middle East region (a source of significant oil and gas) a people revolution in China which could trigger unprecedented levels of consumer demand in that country, a great depression in the US (far more than recently experienced in 2008/9) and/or a complete domination of basic resources by an increasingly autocratic and belligerent China (in the absence of the people revolution).

54. There have been more discoveries from 1945 until today than since the beginning of mankind until 1945. The effect of mobile computing and the internet especially in leveraging market development of agricultural products in poor countries may shift export to domestic consumption. Nano- and bio-technology may enhance human resilience; extending life spans with a consequent drain on country medical resources. Nuclear fusion that could provide mankind with an unlimited supply of energy will still be 30 years away**.** A manned landing on Mars, expected by 2030, may be a little later but will still change mankind's perception of itself, and with renewed optimism for future access to mineral resources.

55. Development of non-lethal weapons (e.g. microwaves) could represent an unwelcome step change in the history of humanity, by avoiding the killing inherently associated with conflicts. This will lower the barrier to solving conflict through military means, especially to secure scarce resources.

56. Climate change, already the cause of extreme and unpredictable weather around the world, will almost certainly have worsened by 2030. Even if the world magically stopped emitting greenhouse gases today, those gases emitted during the last thirty years will continue to influence the Earth's atmosphere deleteriously until at least the middle of the 21st century. For this reason, adapting to the effects of climate change is one of two of humankind's greatest and most important challenges during the period to 2030. The other is to adapt to the increasing restriction (actual, economic or political) of the flows of resources of all kinds from those that have them (predominantly China, India and the poorer nations) to those whose lifestyles and basic assumptions rely on that steady, uninterrupted flow ~ to Europe.

57. A case in point is that of the rare earth metals. Rare earths are used in a host of technologies from iPhones, to fibre-optic cables, to missile guidance systems. They are also essential for a range of low-carbon technologies from catalytic converters, to nuclear power rods; a market that is set to expand exponentially over the coming decades as nations seek to reduce their use of fossil fuels. These obscure metals are used in so many everyday things: photovoltaic modules (gallium) lasers (dysprosium) battery electrodes (lanthanum) self-cleaning ovens (cerium) ceramic capacitors (neodymium) x-ray tubes and computer memory (gadolinium) and fluorescent lamps (terbium) to name just a few. Demand for neodymium will increase by a factor of 3.8 by 2030, while demand for gallium will grow by a factor of six. Yet the main source is China and the signals coming from Beijing are unmistakable: the percentage of rare earths approved for export is shrinking. In 2009 China decided to reduce its exports by about a third compared with the same period in the previous year, keeping most of its output for its own use. The resulting shortage is part of the new natural resources strategy that the powerful Ministry of Industry and Information Technology is pursuing. The government planners have scaled back production, apparently to boost prices, which fell sharply as a result of the financial crisis. Their efforts were successful: recently the price of neodymium has been about £16 per kilo, four times as much as in 2003. Dysprosium is now selling for more than £ 94 per kilo, a tenfold price increase over 2003. Deng Xiaoping, China's legendary reformer, was once quoted as saying: "*The Middle East has oil, China has rare earth*."

58. Even as it stockpiles its own mineral resources, China is systematically securing its access to other resources around the world, including investments in iron mines in Australia, cobalt in Congo and bauxite in Fiji. At the same time, China is filling up its warehouses. Its zinc inventories have more than doubled since March 2009, while its lead supplies have grown by close to 600 percent. A battle over coveted natural resources has now begun, as industrialised nations worldwide vie for access to the biggest reserves.

59. In Europe we have relied on the belief that natural resources would always be available, cheap and abundant, preferring to worry about access to crude oil and natural gas than from where tungsten or indium will come.

60. Of course these sought-after resources are also found buried underground elsewhere in the world. In fact, geologically speaking, there should be no shortages at all. The availability of rare metals is more a

question of price. Smelting companies in the industrialised world (except China) are reluctant to make the substantial investments needed to obtain a few tons of exotic metals. China, with its cheap labour force and lax environmental laws, can afford to extract the materials, however. Rare earth mines are being developed in South Africa, Greenland and Canada. But these mines are at least five years away from being able to generate a significant level of production

61. Global demand for these materials is booming, tripling over the past decade from 40,000 to 120,000 tonnes. China provides 97 per cent of the global supplies of rare earth elements, most coming from a single mine in Inner Mongolia. By 2014 global demand for rare earth materials is forecast to hit 200,000 tonnes a year. But for several years China has been steadily reducing the amount of material it makes available for export. Supplies of Chinese-produced terbium and dysprosium – irreplaceable elements of magnets used in the batteries of hybrid cars and wind turbines – are likely to be cut sharply in the coming year.

62. The World Bank reports that 80 countries now have water shortages[10] that threaten health and economies while 40 percent of the world — more than 2 billion people — have no access to clean water or sanitation. In this context, we cannot expect water conflicts to always be amenably resolved. More than a dozen nations receive most of their water from rivers that cross borders of neighbouring countries viewed as hostile. These include Namibia, Cambodia, the Congo, the Sudan, and Syria, all of whom receive 75 percent or more of their fresh water from the river flow of often hostile upstream neighbours. In the Middle East, a region marked by hostility between nations, obtaining adequate water supplies is a high political priority. For example, water has been a contentious issue in negotiations between Israel and Syria and with Jordan. In recent years, Iraq, Syria and Turkey have exchanged verbal threats over their use of shared rivers[11].

63. A prime cause of the global water concern is the ever-increasing world population. As populations grow, industrial, agricultural and individual water demands escalate. According to the World Bank, world-wide demand for water is doubling every 21 years, more in some regions. Water supply cannot possibly keep pace with demand, as populations soar and cities explode. Population growth alone does not account for increased water demand. Since 1900, there has been a six-fold increase in water use for only a two-fold increase in population size. This reflects greater water usage associated with rising standards of living (e.g. diets containing less grain and more meat).

... and finally

64. Professor John Beddington, the UK's chief scientist, warned in March 2009 that political and business leaders have just 20 years to prepare for a "perfect storm" of climate change-related impacts on food, water and energy supplies or risk public unrest, conflict and mass migration. The combination of climate change, a growing global population and changing dietary habits will result in a surge in demand for food, water and energy by 2030 that will drive up prices and could lead to widespread shortages. Demand for food and energy will increase 50 per cent by 2030, while demand for fresh water will rise 30 per cent as the population grows to top 8.3 billion. Falling levels of agricultural productivity and water shortages across many hot regions will be leading to mass migration and increased risks of cross-border conflict.

65. So, although the bigger geo-political context can only be dealt with (if at all) by Big Government when or if the latter fails then that is when Big Society becomes critical.

So, how will the UK respond, or need to respond, to the above and how should Big Society respond?

66. Quite simply, the UK <u>will need</u> to work towards becoming self-reliant in food, water, energy, travel, waste management, goods and services *etc*. There <u>will need</u> to be a cultural shift in attitudes towards consumerism (though the externalities of supply will do more to achieve this than any self-sacrificing proclamation by "green" types). In fact, green will become the new black and be a self-evident necessity. Most of all, <u>and hardest of all</u>, the population of the UK <u>will need</u> to reduce to a sustainable level of about 35 million, half of the 70 million currently projected for 2050. Without this reduction in population, there will not be sufficient quality space for providing the essential services needed in the future, on a sustainable basis.

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10 http://web.worldbank.org

11 The words "river" and "rival" share the same Latin root; a rival is "*someone who shares the same stream*."

Food

67. The future of the UK's food supply will need to change; the favouring of local foods over imported by the majority, the rejection of genetically-modified food and reliance on “food miles” to measure the environmental cost of food. The way food is bought and sold in the UK will need to have been revolutionised. International food-policy experts already predict similar strategies will be elaborated in developed countries all over the world as the availability of food is increasingly linked to national security, lack of certainty of supply due to climate change and political manoeuvring and ambition.

68. There will need to be a shift to increase in-country food production with a smaller environmental footprint (via adoption of greener farming techniques). The age-old argument that avoiding imported foods will have a negative economic impact on poorer, exporting countries and prevent them lifting themselves out of poverty is flawed and condescending.

69. Some argued that the buy-local philosophy could lead to a desire to “*erect walls around countries instead of seeing ourselves as having a shared destiny*.” That we are far more mutually dependent than ever before is an argument for re-aligning so that we are not dependent on others to feed us. Of course, limited trading with developing countries is beneficial, but not the near wholesale dependency, as now.

Water

70. In England, the average person uses about 150 litres of water a day. This is water that has been cleaned, treated and pumped from reservoirs, rivers and aquifers, with much still leaking out of pipes before it ever gets into the consumer. We have become accustomed to an almost endless supply; for brushing our teeth, filling a glass to drink, taking a shower in the morning or preparing food. But we also use this water to heat our homes and offices, clean our clothes, water our gardens, wash our cars and in thousands of industrial processes.

71. Much of the water we use is then disposed of through sewers. We demand safe bathing water and good public health, so we clean sewage to high standards. But along with direct pollution, for example from agriculture, sewer discharges continue to cause problems for the natural environment of our rivers, lakes and seas. Our need to adapt to climate change, our water intensive lifestyle and other pressures such as changing land use, will force us to find ways of using water much more efficiently and sustainably if we are to continue to enjoy a reasonable standard and constant supply.

72. Certain parts of the UK (such as the south east and east of England) already face increasing demand on a finite water supply. The drought of 2004-06 was only managed through controls on what we were allowed to use. This was not a one-off; indeed droughts are likely to be more common. By 2080, some long term climate projections forecast half as much rainfall in summer (nothing like fully offset by 30% more rainfall in winter) in the south east for instance.

73. We have, of course, not only to cope with too little water. Recently there has been too much water with serious flooding in many parts of the country. We still have lessons to learn as a country about defending ourselves from, and learning to live with, floods. One particular issue is how we cope with ‘surface water’ flooding. Just as climate change seems likely to mean less water on average, it is also likely to mean more extreme weather events, with more inland and coastal flooding. Urban design will have to take into account monsoon-like deluges of water with open waterways rather than the block-prone pipework on which we currently rely.

74. Other practical steps that we will need to take will include: improving the supply of water; agreeing on important new infrastructure (e.g. reservoirs); proposals to time-limit abstraction licences, and severe penalties for non-reduction of leakage. We will have to reduce demand, through better building design, more efficient appliances and improving industrial processes, and ensuring that as we move increasingly towards water metering in areas where supplies are under pressure, this is done in the fairest and most effective way. And, of course, we need to build houses, that precipitate the demand for water, in sensible places.

Energy

75. By 2020, the UK may be generating only about 80% of the electricity it needs. Although fossil fuels will remain the mainstay of supply, with renewables expanding, nuclear power will still be advocated, arguing that if the UK is to remain on the path of reducing atmospheric emissions of greenhouse gases, it will need to retain some nuclear capacity. Renewables could supply 40% of generation by 2050 but a short-sighted lack of research and development between 1990 and 2010 ensured twenty years of delay.

76. The immediate issue is the impending closure of most British nuclear power stations and many coal-fired units. By 2015, all four Magnox nuclear stations still operating will have shut down, as will five of the seven stations running Advanced Gas-Cooled Reactors. Under the European Large Combustion Plant Directive, many of the nation's coal-fired plants will also close during the next decade.

77. In principle, the gap could be bridged by new power stations burning gas or coal; but this would work against the UK's agreed short term targets and long term aspirations of reducing greenhouse gas emissions. Meanwhile, demand will continue to rise; and managing that demand will be a key issue. Technologies exist to increase efficiencies, but they are not being used to anything like their full potential, largely because the public is not properly engaged in the energy issue.

78. Investment in renewables has been long overdue and so the gap in electricity supplies left by nuclear closures will almost certainly have to be bridged by building new reactors, if the UK is to fulfil its long term ambitions on climate change. That is one view. Another is that more than 50% of Britain's greenhouse gas emissions come directly or indirectly from buildings; and the key to dealing with that source of emissions lies in renewables and energy efficiency.

Travel

79. The amount we travel in the UK is rising quickly, and although we travel to gain access to goods, services, people and employment that will boost our quality of life, there are major economic and environmental costs to pay. Congestion and delays cost businesses money, and almost every mode of transport creates pollution and contributes to climate change. We will need to invest ever greater sums in improving our capacity and acceptance in Information and Communication Technology (ICT).

80. ICT-use has the potential to reduce the amount we travel, for example by making it easier to work or shop from home. The government has yet to understand this and develop appropriate policies. The concept of car ownership will need to change, however unpalatable this is to currently-living generations, and public transport will need to be taken seriously and developed as a common good.

Waste Management

81. The four-fold increase in UK recycling rates during the last decade means that one third of our waste is now diverted from landfill, a figure that seemed unattainable just a few years ago. The best local authorities are now recycling or composting over half of their waste, so the national figure could increase even further. Even so the UK is at serious risk of failing to reach EU targets to cut the amount of waste it sends to landfill. To cut down on what we send to landfill, we need to do three things; increase recycling, reduce the overall amount of waste we produce and, perhaps most controversially, find new approaches to how we deal with what is left over.

82. Encouraging people to cut the waste they produce is a much more complex communications and policy challenge than simply promoting recycling, which is a relatively simple message to convey. It requires fundamental shifts in not only 'at-home' behaviours, such as re-use and home composting, but also changing peoples' purchasing decisions and their fundamental attitudes towards consumption.

Work

83. The world's economy, emerging from the downturn, is set to double in size creating major new opportunities for UK business. But global competition is increasingly tougher and technological change increasingly faster. The UK will need to invest and skill-up to win in high-value markets and sectors. To succeed in this hi-tech, low carbon economy of the future, to drive growth and to secure more high-value jobs in the UK, we need to act. Key areas identified for immediate action and reform to win a bigger share of the opportunities ahead are centred on innovation, skills, finance, infrastructure and trade.

84. They include:

- making sure high growth, high innovation firms have the financing they need;
- more support for turning bright ideas into products that win in the marketplace and maximising economic opportunities from the work of our university researchers;
- improving our ability to identify the skills needed for future success and making sure the education and training system delivers them;
- smarter, more joined-up government that; understands the importance of creating wealth, is better at identifying economic opportunities from the big public challenges facing us (especially moving to a low carbon world) and uses its buying power to support innovation and skills; and,
- a coherent strategy for making sure the UK has the modern infrastructure and networks, from energy to super-broadband, that will be the foundation of future prosperity.

Housing and Spatial Planning

85. The UK housing system is large and complex, being intrinsically linked to almost every major area of government policy. It has become increasingly flawed and now has significant dysfunctional components.

86. We now have a rare opportunity to respond to the challenges posed by the dysfunction in the current system, to evaluate the role that housing should play in a low-carbon society and to act to deliver changes that will improve the system. There is now a widespread recognition of the need to address the failure of the current system as a whole, rather than tinker with various component parts. This historic opportunity to improve the UK housing system has arisen with the convergence of a number of significant changes. These include changes that have occurred within the housing system, such as the re-emergence of the private rented sector, and changes in the wider economy including the nationalisation of major UK mortgage lenders. Viewed together, this combination of changes will cause major shifts in the housing system. Without intervention these changes are likely to increase the dysfunction in the system, but with the right programme of actions they could provide an opportunity to make changes that would lead to significant improvements.

87. The potential of spatial planning to deliver sustainable development failed in the years to 2010 due to the confusion about its purpose, a failure to integrate planning with other sectors, and a lack of integrated delivery mechanisms. Regional spatial strategies were designed to put a sustainable approach at the heart of the planning system. Spatial planning was hampered by a widespread failure to arrive at a shared vision of what sustainable development means for a particular region. Central government and key local government actors were complicit in this and failed to work closely with a far wider range of local key players to ensure that spatial planning realised its potential to deliver sustainable development.

88. Central government should not be allowed to "hand out" house numbers. Planning professionals traditionally have poor linkages with professionals in departments such as health, welfare and education on whose spending decisions will have a critical impact on the spatial strategy. House builders <u>should have no input</u> into the spatial planning decisions of the future. Their role is to build the required number of houses to the standards required. The lack of ability, painful resistance to admit mistakes, gross errors of judgement and, at times, out right deception in central government means that there is an opportunity for Big Society to facilitate realignments, from the increasingly overly-centralised governments since 1945, to more locally-based and increasingly accountable decision-making. It will only be just in time.

89. Big Society needs to recognise and adapt to the changes needed in the provision of food, water, energy, travel, waste management, goods and services *etc*. The way all these things are organised needs to be re-thought. Big Society cannot be only about how to deliver public expenditure cuts. It has to be so much more than this. Sustainable development needs to be properly defined, within an appropriate setting of land use, food, water and energy security, availability of resources and population.

90. The assumptions of perpetual economic growth, unrestrained house-building and blinkered spatial planning needs should be consigned in the dustbin of the past. What is needed now is a recognition that Big Government is needed for the planet-wide challenges and Big Society is needed to drive forward some key adaptive principles which allow for:

- Genuine local decision-making
- 50% of all goods and services to come from no more than 10 miles away from point of use
- Time to invest in family, friends and community
- Where young people are able to walk to their school
- Where 50% of all work is local and people no longer need to commute great distances
- Villages no longer serve as dormitories to nearby towns and cities
- Speed limits are lower, and cars are fewer, smaller, electric and resource-friendly
- Houses are homes, built to last, energy efficient, capture and use rainwater and large enough to accommodate different generations under one roof, if wished
- Older homes are upgraded before new ones are built
- Houses are affordable (where "affordable" means that the houses are able to be bought by those that need them, based on average salaries)
- New houses are built that respect the constraints of the land and the climate and with gardens that can grow food and provide a haven for wildlife
- Enough allotments for everyone who wants one
- Wildlife-rich havens within easy walking distance where the wildlife is abundant and wildlife habitats are interconnected; and footpaths are well maintained

- Land to be farmed productively, growing crops for local consumption and free from chemicals
- Energy to be valued and generated locally
- Water to be valued and not wasted

91. None of the above is idealistic. It is all technically achievable and merely requires appropriate freedoms and permissions from Big Government, and for those who are unable to accommodate this in local authority to move aside.

92. Even with a Big Society there are many unknowns. Within twenty years currently unthinkable scientific breakthroughs will have occurred – in computing, in healthcare, in communications, in wealth generation, in materials performance, in additive manufacturing, in travel and in robotics. Shortly after 2030 a milestone in technological development will have been reached.

93. Around this time, the first computer will have been developed that will be the intellectual equal of a human. Because of the accelerating, exponential nature of technological development (fuelled entirely by faster and richer information flows) it follows that a short time after that we will be assisted by our super-intelligent computers to build a machine twice as clever as the most capable human. Shortly after, will appear a machine four times as clever as a human, then eight times as clever, then sixteen times as clever, and so on. Once super-intelligent machines begin to take over the task of technological development, as they surely will, change will be so rapid that most people will be controlled by it, rather than the converse, and the future could then take unforeseeable directions.

100 By then, one hopes that the Big Society will have figured out how to live with that.