Brief Report and Summary of Presentations

at the Meeting of the Sino European Panel on Land and Soil (SEPLS)

held in the European Commission, DG Environment Brussels, 15 April 2013.

The group were welcomed to Brussels and DG Environment by Luca Marmo (Soils – DG Environment)

Presentations:

1. **Gergely Toth (IES – JRC)** briefly outlined the history of SEPLS. The report (Edited by Gergely Toth and Xiubin Li) from the meeting held in Nanjing in February 2012 was formally presented This focused on the first of the priority areas identified by the Panel, Food Security, and sought to consider the similarities and differences in the processes in China and the EU. The Chapters of the Report are: Introduction; Socio-economic background and current trends; the DPSIR assessment methodology; the impact of urbanisation and infrastructural development; agricultural intensification; soil degradation and Policies and Recommendations. It was clear that there are a number of similarities in both the problems and the possible solutions in the two regions as well as differences. The focus for this meeting in 2013 was the allocation of land resources with a particular emphasis on soil sealing and the strategies to reduce the nature and extent of such sealing. Subjects identified for future discussion were Ecosystem Services and the broad area of Land Degradation and Land Management Practices.

2. **Minghong Tang (Chinese Academy of Sciences – IGSNRR)** presented a paper he authored with Xiubin Li on '***Changes in Sealing Surface in China***'. China has experienced a rapid growth in the Built up area in recent years and by 2010 the built up area was 40, 000km^2. This increase has been focused in East China. This continues the trend experienced during the decade 1990-2000 where there had been a 44% increase in the urban areas in the East of 44%, a C. 18% increase in the Central region and a 33% increase in the West region. The result is a concentration of urban areas in the East. This growth in urban areas involved densely populated urban residential areas (with an increase in multi-storey accommodation), industrial and government department development and marked increases in rural residential areas. This increase in rural residences for the urban population has resulted in substantial arable land loss, particularly in areas surround the small cities. This urban expansion has been considerably greater than the growth in population, for example in cities over 0.5m population from 2000-2009 the growth in population averaged 5.83% and the increase in built up area was 7.01%. This relative decrease in population density has been matched by an increase in car use, but it should be noted that China has a high population density in comparison to Europe, USA, and Japan and is only exceeded by India amongst large nations. It is expected that China has or will very shortly reach a 50% urbanised population. There are plans to slow down the rate of population growth in the largest cities, but for Beijing and Shanghai with predicted

populations of 20 million in 2020, the population in 2011 was 20.13 million and 23.47 million respectively. At present urban expansion is continuing at a very rapid rate.

3. **Thomas Strassburger (DG Env)** presented a paper entitled **'Soil Sealing Guidelines – supporting better land management in the EU.'**

   The paper began by drawing comparison between the EU and China. Land area: EU 4.3m km^2 – China 9.6m km^2. Population: EU 0.5 billion – China 1.4 billion. Urbanisation: EU 75% - China 52%. Land Use: EU Grassland 13%, Arable Land 24%, Forests 30%, artificial surfaces 5%; China Grassland 24%, Arable Land 36%, Deserts 21%, Forests 9%, cities etc. 1.5%. Within China most of the urbanisation is taking place to the south and east of the 380mm isohyet. Loss of land by sealing is one aspect of overall soil degradation which is estimated to cost €38m annually. Currently annual land loss to sealing is approximately 1000 km^2, broadly equivalent to the area of Berlin. In the period 2000-2006 loss to soil sealing was particularly marked in Spain, Portugal, Ireland, Cyprus and the Benelux countries. The sealing of soil has major impacts on many environmental characteristics of soil, for example soil hydrology with the loss of considerable water storage capacity, with the potential impact of increased runoff and flooding and temperature increases due to the loss of evaporative cooling from the soil surface; soil biodiversity; the loss of a significant carbon pool. The loss of land through sealing has reduced crop production across the EU, estimated at 6.1 million tonnes of wheat from 1990 to 2006, with significant losses of output in Germany, France and the Netherlands. As a consequence of these impacts of soil sealing, this is recognised as one of the major environmental challenges in the 21st Century. In response to this the EC has produced in 2012 'Guidelines on best practice to limit, mitigate or compensate soil sealing (SWD(2012) 101 final/2, 15 May 2012). This document seeks to limit the loss of soil through sealing, both by slowing down the rate of land take and by reusing previously used land (brownfield), to mitigate the effects of sealing through the use, for example, of permeable materials and green infrastructure, and where possible to compensate for sealing through re-suing topsoil, de-sealing, eco-accounts and sealing fees. There are a number of examples where these practices have been successful in reducing the losses through sealing. These actions are supported by the **7th Environmental Action Programme 2012-2020**, and in 2014 there will be an EC communication on **land as a resource**.

4. **Gan-Lin Zhang (Chinese Academy of Sciences – SSI)** presented a paper co-authored with Jin-Ling Yang and Ren-Fang Shen, entitled **'Urban soil sealing and compaction and their eco-environmental impacts.'**

   The paper began by highlighting the rapid shift towards urbanisation in China; by 2012 50% of China's population was urbanised, from a level of 10.6% in 1949. Whilst highlighting the loss of soil through sealing, it was noted that much land close to that which is sealed is also lost through compaction. Below sealed and compacted soils the physical soil properties are markedly different from under arable conditions, with higher bulk densities under sealed and compacted soils, with associated lowering of infiltration rates where compaction occurs, additionally many soils in non-rural environments will have a high proportion of large fragments (bricks and other building materials) in the upper layers. Apart from the direct

impacts on the soil there are also numerous ecological impacts of soil sealing and compaction. These included urban flooding, a decline in soil water quality through contamination with runoff water from urban environments, poor plant growth, a heat island effect, limited gas exchange at the soil surface and lower microbial biomass and enzyme activities. The loss of soil water storage and the rapid runoff in urban drainage systems has resulted in a marked increase in the frequency and extent of urban flooding, with inundations occurring more widely and in areas not previously subject to flooding. The heat island effect is also becoming a major consequence of the increase in soil sealing with temperatures in large urban areas being higher, particularly because of the higher temperatures associated with pavements and buildings. A study in Suzhou a city which has grown rapidly in the last decade shows a marked increase in average temperatures because of this heat-island effect. The changes in soil and related environmental conditions with the increase of urbanisation and soil sealing occur rapidly and maybe irreversible. Future planning of urban development must recognise these impacts and seek to mitigate them.

5. **Winfried Blum (BOKU, Vienna)** presented a paper entitled **Land resource allocation: General trends and future scenarios – a worldwide perspective.**
   This paper took a global perspective and began by highlighting the key played by soil in providing goods and services. It was also highlighted that there is a limited supply of good quality land, most of which is already used for intensive agricultural production or is sealed by urbanisation. In a global perspective there are a number of key trends: the growth of global population and its increasing concentration in urban areas (annual increase of c. 85 million, annual shift from rural to urban between 100 and 150 million); the loss of fertile land through urbanisation and other human impacts; the changing lifestyles with a shift to more meat based food consumption; increasing demand for bioenergy; global shifts in the economic balance and structure; changes in local and global climate; decrease in the supply and availability of fresh water. The dramatic increases in population and food demand have been accommodated in the last 50 years by dramatic increases in productivity. Urbanisation and the associated infrastructure is a major driver for loss of arable land, the infrastructure often results in fragmentation of arable land which reduces productivity. The shift in food consumption from grain to meat has been compensated for by rapid increases in yields, but to sustain this change cereal yields will need to increase from 2.64 MG per hectare in 2000 to around 4.30 Mg per hectare in 2050. Further pressure on grain production has been introduced by the production of ethanol as an energy source from grain. This, frequently government supported drive for bioenergy, has resulted in diversion of grain from food to energy production. It is widely recognised that global climates are changing, various scenarios suggest there will be marked shifts in climate in some areas now major food producing areas, with global impacts. Increasing areas of food production rely upon irrigation to sustain yields. There is increasing concern that there is insufficient fresh water to sustain the needs of the human population and the demands from irrigated agriculture. The conclusion is that allocation of land resources is a complex task involving many ecological, technological, economic, social, cultural and political aspects. These different perspectives need to be brought together to ensure that the problem is addressed in a timely manner.

6. **Taiyang Zhong (Nanjing University, China)** presented a paper entitled **Success or Failure: Evaluating the Implementation of National Land Use Planning in China.**

   This paper briefly outlined Chain's land use planning system. This 'top down' system has two distinct components underpinned by law; an urban planning system and a Land Use Planning system which addresses both urban and rural land allocations. Whilst these are 'top down' the detailed decision making is at the land use administration and construction agencies at a variety of levels within the broadly five tiered system. Lower tiers must make their plans taking account of the national plans. The third National Plan was produced in 2008 and provides the guiding principles for planning. Evaluating the success of the first Plan (1193) is difficult because of the lack of appropriate statistical measures, but it is widely considered not to have been implemented effectively. It is possible to evaluate the successes of the second and third plans, but frequently this is a lack of connectivity between the higher level plans for an area and the local implementation by local planning authorities. There have been some successes, although not to the degree outlined in the National Plans. Planned increases in coverage of forestry, grassland and to a lesser degree arable land have all been accomplished, although, for example, the targets for the national land devoted to arable agriculture was reduced between the second and third plans. There are targets in both plans for construction land and ecological conservation of land. The construction land target was exceeded in the second planning period and seems likely to be exceeded in the third period. The 'Green for Grain' programme helped the drive for ecological conservation of land, but no specific data are available. In the third plan these goals were qualitative rather than quantitative. In conclusion there is a degree of horizontal mismatch between the two areas; land use planning and urban planning. The coordination vertically has been difficult to monitor, because many local governments have ignored their own general land use plans, particularly in relation to the required areas of arable land. In some areas arable land occurs in isolated fragments so is difficult to manage and susceptible to consumption for urban uses. There is also, the unquantified threat of contamination of arable land rendering it unsuitable for arable production. There are policies in the third plan to address these issues, although these are only qualitative guidelines and difficult to monitor. At the scale of a large nation such as China the coordination of land use planning is the major challenge to successful implementation of the policies.

7. **Carlo Lavalle (IES – JRC)** presented a paper entitled **Outlook for Europe: Applications of the Land Use Modelling Platform.**

   The broad principles of the Land Use Modelling Platform were outlined, focusing on understanding and interpreting changes in land use cover. The aim is to: evaluate direct and indirect aspects of policies over time; determine the critical factors in land use change; correlate and interconnect sectors; compare and evaluate alternative options of development; locate the impacts and effects of land use changes. LUMP has three main components; Interfaces with exogenous models for different sectors (e.g. climate context, conflicting demands); Endogenous allocation model which includes suitability factors and neighbourhood effects and zoning alternatives; Impact assessment tools. This model is used in a variety of contexts, for example in allocating priority areas for agricultural production and forestry and evaluating the impacts of a shift towards new energy crops. The model will identify the most suitable locations for energy crop production in terms of topographical

and geographical position, the soil, the climate and water availability. The output is an EU-wide suitability map. The model enables similar evaluations to be of different scenarios, for example the evaluation of changes in the Common Agricultural Policy, the provision of recreational space and the changes in water retention measures following urban developments. Planning across Europe requires this type of modelling if the full implications of policy and related changes are to be evaluated and anticipated.

8. **Yang Quingyuan (Southwest University, China)** presented a paper entitled '**Land System Reform in Practice of China's Urban-rural Integration Development —A Case of Chongqing and Chengdu.**

   The presentation began by briefly summarising some of the dramatic changes which have taken place in China. These changes, driven by industrialisation, urbanisation, agricultural modernisation, a dominance of the market economy, globalisation within the context of a socialist reform system, have brought about migration from rural to urban communities and sharp differences between the communities in rural and urban contexts For example the income ratio between urban and rural residents is 4.6 in Chongqing and 3.15 in Chengdu, against an international standard of 2.0. National policies have highlighted the need to provide greater integration between rural and urban areas and to seek to narrow the gap in income and overall provision of facilities. The Chengdu-Chongqing Region was chosen to investigate the success of these policies because of its important role in the 'West Development', the region that China wishes to develop further. There is a scarcity of supply of urban construction land, with a demand 4.5 times what is scheduled to be made available. The development of secondary and tertiary industries with high labour demands has resulted in inflow to urban areas with much rural land left desolate. Because of the marked difference between the per capita land in rural areas ($240m^2$) and urban areas ($80m^2$) the gain in land from rural depopulation may result in increased provision of arable land if managed correctly (for example the clearance of farm buildings). To facilitate this movement rural residents in the area have been provided with 'land tickets' which can be used to purchase urban land. This system begins to provide a true asset value for construction land whilst also resulting in rural land consolidation. This system has introduced a more structured market based system in to the process of migration from rural to urban environments. The market based system has also aided the introduction of a household registration system which also brings a degree of control to the urbanisation process. This system seems to offer the possibility of providing a structured system for rural to urban migration , with reinvestment back in rural areas.

9. **Cheng Wang (Southwest University, China)** presented a paper entitled **' Land Use Zoning of Chongqing Municipality.'**

   The underlying theme of this paper was that the system should protect resources whilst ensuring appropriate development. The paper highlighted the continuing increase in urbanisation in the last 15 years and the slight decline in arable land over the same period. The task facing China is how to divide up the 'Land Cake' when faced with a large population and an economy developing rapidly. Land Use Regulation is a way forward to ensure that the development of land use during these periods of rapid growth is managed. There are two types of regulation; the broad determination of land use through Zoning Ordinances

and the detailed specification through Planning Permissions. Sometimes this is not a good match between these two approaches. The case of the Chapingba District of Chongqing was used to illustrate this potential problem. This district is a key area of Chongqing which is bordered in the east by the Jialin River and the west by Jinyun Mountains. The area includes some good quality arable land. In developing this area there was a need to address the need for an ecological environment, the protection of arable land and provision of land for urban and industrial development. The process of the planning framework was outlined from the initial data collection, through training and field research, consultation and coordination through to the final programme. The result was a scheme of four distinct but broad zones; the eastern developed urban and industrial concentration area; a tourist zone for ecological agriculture; a western comprehensive development zone; and a zone in the northwest for modern leisure agriculture for both production and sightseeing. Because of the process undertaken there is a good quality database which has resulted in a zoning based on good quality information and is a more open process which can be observed and understood by the population. There is considerable local government involvement in the process.

10. **Wiet Vandale (Flanders Pace Planning, Legal and Policy Development Department)** presented a paper entitled **'Towards regional development without land take – the case of Flanders.'**

    This paper introduced the audience to the two parts of Belgium, Flanders in the north and Wallonia in the south. These areas have separate strategies for land planning and management. Flanders has a population of over 6 million over 13,521 km^2. Satellite imagery shows there to be a dense network of interconnected inhabited areas and associated infrastructure. A brief history of land planning was presented from the Belgium Act of Urbanism in 1962 which characterised and mapped the landscape in to different uses. In 1997 there was a Spatial Structure Plan which provided broad zoning guidance across the region. In 2012 a Green Paper was produced which sought to emphasis planning until 2050 at a human scale. One of the underpinning features of these plans was that regional development should be undertaken without land take. The proposal is that this Green Paper which sets out the plans for discussion and consultation will move towards a White Paper. This will outline specific policies and ordinances to achieve the objective of spatial neutrality and maintain spatial quality through its focus on the human perspective with a number of additional key targets including, the introduction of blue-green arteries, reinforcing Flanders' metropolitan position, developing resilient landscapes, ensuring that there is room for food, water and biodiversity and increasing the performance of the logistic network. One of the basic aims is to ensure that the net land take is zero by 2050. For example where 'green' land is 'consumed' for development an equivalent amount of 'brown' land must be transformed to 'green'. Examples of how the key targets in the White Paper are being achieved or will be achieved were presented. The evidence presented suggests that if the targets are well defined and there is public support plus a framework to ensure the policies are enacted this zero land take and a well balanced land use is achievable.