GMES User Forum

Land monitoring service

The scope of the GMES land monitoring service as proposed in the Initial Operations phase (2011-2013) is the result of a long user consultation process. A summary of established user requirements was presented at the GMES User forum preparatory workshop on land monitoring held in Brussels on 9 March 2011 and was recognised as a good starting point for the initial operations. The first priority for the User Forum is to consolidate the proposals for the GMES Initial Operations land service components. A consultation process at European and national level should also be set up for the definition of the service in a long-term perspective.

The purpose of this paper is to provide an overview of the consultation of GMES users for the land service in the past and the way forward based on the conclusions of the preparatory workshop held in March 2011. It was presented to the User Forum and discussed at its first meeting on 17 May 2011. It has been updated taking into account the oral and written comments received from delegations. It is considered as a reference document for the Land monitoring Service for the initial operations phase during the 2011-2013 period.

A new and comprehensive user requirements document will have to be established for the fully fledged operational phase of GMES in the post 2013 period.

This document was presented and discussed at the first meeting of the GMES User Forum on 17 May 2011.
1. Introduction

The scope and definition of the land monitoring service as part of the GMES initial operations programme 2011-2013 (GIO), is the result of several years of consultations with expert groups, by projects and thematic workshops and through EEA’s Environmental Information and Observation network – EIONET involved in precursor activities (Corine Land Cover and the GMES precursor service for the production of High Resolution Land Cover layer in 2006-2008). A GMES User Forum preparatory workshop for land monitoring was held on 9 March 2011, jointly organised by the GMES Bureau in DG Enterprise and the Chief Scientist unit of DG Environment with the objectives to take stock of the past user consultation process, to discuss the scope of the future service and to prepare for the formal User Forum. A wide range of public users was invited as well as members of the GMES Partners Board, Committee and User Forum., This document presents a summary of the outcomes of this preparatory workshop. The objective is the definition of the Land monitoring service, as regards user and service data requirements elaborated so far to be endorsed by the User Forum.

2. Overview of users' involvement

The definition of the land monitoring service started with initial studies defining the orientations of the services and by a workshop organised in October 2005 to define the GMES land monitoring service. In 2006, the Commission established an Implementation Group (IG) on the Land Monitoring Core Service composed of a small group of experts and user representatives from EU institutions and national public services. The IG met 19 times between 2006 and 2010 and produced reports1 on the implementation of the Land Monitoring Core Service and on the space and in situ data requirements. The Global component was addressed by a specific Working Group on Global Land (WG-GL) with experts and user representatives from this community (EU institutions, FAO, ECMWF, national research institutes). The WG-GL compiled user requirements in a report2 which was presented in a workshop organised in Stresa in May 2009. The recommendations of the Land Monitoring IG and the WG-GL were used to define the contents of the FP7 precursor projects, and to elaborate proposals for the GMES Initial Operational phase.

In parallel, user requirements were also collected by the GMES-related Land Service precursor projects (ESA GMES Service Elements on land, forest, urban, FP6 Geoland, as well as FP7 Geoland-2) which organised a series of user workshops or fora. Users have been regularly informed on the progress status of the projects and were invited to provide their feed-back on the products made available.

1 http://www.gmes.info/pages-principales/library/implementation-groups/land-monitoring-core-servicelmcs/
The EEA organised also regular consultation of users at national and European level through its Environmental Information and Observation network – EIONET involved in precursor activities (Corine Land Cover and the GMES precursor service for the production of High Resolution Land Cover layer in 2006-2008).

Another important step forward was the INSPIRE-GMES workshop on land cover co-organised by the Spanish authorities and the European Commission (DG ENTR and JRC) which took place in Madrid in July 2009. This workshop brought together experts at various levels (European, National, Global) (i) to define medium and long-term strategies for the future of European Land Cover (LC) and Land Use (LU) activities, (ii) to investigate possible approaches for harmonising information from various sources, and (iii) to explore how centralised and decentralised approaches can complement each other. As follow up to the Madrid workshop, an EIONET Action Group on Land Monitoring in Europe (EAGLE) was established in September 2009, to address the harmonisation of land cover information at European level and synergies with already existing national land monitoring programmes.

3. Summary of Established User Requirements

A summary of established user requirements was presented at the UF Land preparatory workshop as the basis for the GIO Work Programme 2011 and 2012 and it was recognised as a good starting point for the initial operations.

However, the land monitoring perimeter is large, covering a broad range of resources and policies (soils, water, agriculture, forestry, biodiversity, transport, regional policies etc.). The community of potential (public) users of the land service is very broad with varying needs at different levels and various scales e.g. specialists in Member States wanting to access raw data or needing more frequent change mapping updates to complement national activities, or requiring support of reporting requirements under the acquis; or EU policy-makers interested in highly elaborated products (e.g. indicators, trends) in support of evidence for policy.

On this basis, a modular approach was proposed for the implementation of the land service, starting with the provision of multi-purpose information common to a broad range of users (e.g. land cover change information at various scales _ global, European, national or local level _ and periodicity) and extending progressively to more thematic components, if further required by users. Three components were defined:

- Pan European land cover component

There are many existing land cover and land use activities at global, European and national level. European countries have a long tradition of land monitoring at national level adapted to their own national requirements. Harmonised pan-European land cover mapping started in the 1980s with the first Corine Land Cover (CLC) exercise. The spatial resolution of the initial Corine Land Cover products (25 ha) being considered as insufficient by users at national level, it was progressively improved (Corine Land Cover Change resolution is now 5 ha). In parallel the first high resolution layers (at 1 ha resolution) on forest and soil sealing at Pan-European level were developed in precursor projects.

The continuation of Corine Land Cover activities with additional High Resolution land cover Layers (1 ha resolution) as proposed for the Pan-European component of the GIO land service, is the result of technical development in precursor activities and consultations with users over the last two decades.
In line with the GIO regulation\(^1\), the implementation of the pan-European continental component foresees a combination of centralized and decentralized functions:

- Centralized production by commercial service providers of image post processing and production of High Resolution Layers (HRLs) combined with decentralized verification and enhancement by Member States;
- Decentralized production of the Corine Land Cover update by EEA Member and associated countries, involving production of high-resolution layers, Corine update and validation.

Participants of the UF land preparatory workshop welcomed the approach, calling for enhanced synergies between data / information activities at all levels, but also recognising the complexity of managing a centralised/decentralised model in GIO, and calling for the right balance in this combination. Existing national inventories and data sets may contribute to the production of the 5 high resolution Pan-European land cover layers, via the “bottom-up” approach; but this would depend on consistency and coherence in information/images. The forthcoming EIONET workshop on the implementation of GIO land (planned for the 11\(^{th}\) and 12\(^{th}\) May in Copenhagen) will be a crucial step in resolving these and other issues.

It was also recognised that INSPIRE (INfrastructure for SPatial InfoRmation in Europe) has significant synergies with GMES, as it provides a basis for the sharing of data by public institutions. However, the timeline for the development of INSPIRE does not help with the provision of reference data in the very short term. It was pointed out that GMES products should generally be fully open and inter-operable, in line with GEO data policy principles and INSPIRE provisions. An assurance of continuity was similarly identified as fundamental to the broader uptake of GMES products.

### Local component

A 'local' component focusing on specific areas of interest for the monitoring of EU policies (e.g. urban areas, coastal areas, biodiversity..) was also identified. This component builds on the same approach as for Urban Atlas extending progressively to other areas of interest.

### Global component

The Working Group on Global Land (WG-GL) compiled user requirements in a report which was presented in a workshop in Stresa in May 2009. The objectives defined in the Stresa workshop are to provide information services on the status and evolution of land surfaces in support to specific EU policies at international level (e.g. EU development policies) and European commitments under international treaties and conventions, such as the three Rio conventions on Climate Change, Desertification and Biodiversity.

The proposed scope for the global component is to offer a portfolio of data and products, with different levels of elaboration fulfilling both generic and specific application requirements. The first priority is to set up a *Global Systematic Monitoring Service*, providing near real time bio-geophysical parameters at global scale describing the vegetation state and dynamic and addressing primarily 13 terrestrial ECVs (Essential Climate Variables). The scope could be further extended to a *Hot Spots ad hoc Global Monitoring Service*, delivering products on an ad hoc basis, upon request by European or international / intergovernmental institutions and initiatives. The products will be of limited coverage extension and could address specific region of interest, such as Africa. More *thematic services* addressing EU sectoral policies and

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specific thematic areas (e.g. soil/land degradation, forest management, water management, urban development, crop production and food security, etc.) could be progressively implemented, starting with already mature service elements.

4. Consolidating the proposal for GMES Initial Operations Land service

Based on the above described user consultation three priorities were defined for the implementation of the land service under the GMES initial operations:

A. A GIO Pan-European (EEA member and cooperating countries) continental component taking into account the recent discussions on the strategy for future land cover activities at EU level, namely: (i) the continuity of Corine Land Cover (CLC) with a new exercise based on 2011-12 data, (ii) the production of 5 additional Pan-European High Resolution Layers (HRLs) in complement to CLC (soil imperviousness, forest, agriculture, wetland and water bodies), building on the outcomes of Geoland-2 and (iii) supporting the harmonisation efforts of the Member States (MS) and the synergies between Pan-European and national land cover activities, linked to the implementation of INSPIRE Annex II. This component is considered as well mature in terms of definition of user requirements.

B. A GIO local component providing more detailed information (‘hot spot’ zooming) on Land Cover/Land Cover Change over areas of interest. This component builds on the current 2009 Urban Atlas exercise (funded by European Regional Funds) delivering high resolution mapping of urban areas over more than 300 cities. It is expected to be updated in 2012-2013 (funded by European Regional Funds again). It could be extended to other areas of interest or 'hot spots'. DG-ENV proposes to focus on biodiversity and monitoring of loss, deterioration and fragmentation of habitats, and the threats and pressures (agriculture, climate change) behind any changes. Additional requirements are expressed for fluvial and coastal impact assessments, which are linked to reporting on environmental risk assessments and the White Paper on Adaptation Clearinghouse for Europe of the Commission. Further user consultation is required for consolidating the scope.

C. A GIO global component producing global terrestrial Variables and integrating them into land assimilation schemes for crop monitoring (DG AGRI), Food security (DG DEVCO and DG ECHO), for Carbon budget (DG CLIMA, DG DEVCO and DG ENV), with additional elements on water, droughts and global biodiversity monitoring (DG ENV and DG DEVCO), and on the reinforcement of the GMES Africa initiative (DG DEVCO). This component will partly build on the service elements developed and validated in Geoland and Geoland-2 (BIOPAR) and on other existing capacities in Europe (ESA, JRC MARS, AMESD, EUMETSAT Land-SAF). Further user consultation is required for prioritising the activities.

In addition, a more cross-cutting component of access to reference data building on the 2009 GMES Preparatory Action was proposed. This component is very closely linked to the in situ component with the objective to create the conditions to access the existing reference data and to complement European reference datasets where gaps exist. This component will be closely linked with the on-going development of INSPIRE and SEIS. The definition of detailed scope will require further stabilisation, in coordination with other stakeholders at EU and national levels, involved in the implementation of INSPIRE Annex I.

5. Way forward

The definition of services will be subject to further discussions from 2011 onwards, including consultations with the User Forum. The scope of the Pan-European component already part of GIO WP 2011 is considered as well stabilised due to the extensive user consultations and
precursor activities. The Global component has been proposed to be addressed in GIO WP 2012. The local component and access to reference data will be proposed in GIO WP 2013 and their scope requires further elaboration. The definition of services of the local component will be object of further discussions in 2011, including consultations with the user community. An action focusing on biodiversity-relevant areas within Europe is planned for 2013, with further technical consolidation on-going and concrete proposals to be presented to the User Forum by end 2011. The Commission requested EEA to take the lead in coordinating the technical implementation of the Pan-European and local component.

User consultation processes need to be intensified at both EU and national levels in support of the User Forum which is tasked with advising the Commission as to the definition and validation of user and service data requirements. For GMES land monitoring activities as a test case for other GMES themes, it will be crucial to further develop the engagement of EEA’s EIONET\(^1\) (while noting its characteristic as a forum for expert consultation) and of key DG Environment expert groups and policy committees. As regards the land monitoring domain, DG ENV is a prominent Directorate General interested in improving its knowledge base for policy making, implementing and reviewing and which stands to profit in many policy areas from GMES outputs. DG ENV on a regular basis animates over 150 official expert groups and policy committees, consisting of experts and representatives from the Member States. So far there have been few attempts to exploit this potential of accumulated sectoral expertise for GMES and consult Member State representative in these groups directly. DG ENV is planning to consult with relevant Committees related to policy implementation such as the Water Framework Directive, Flood directive, Habitat Directive in order to see how reporting needs of Member States might be better addressed through the GMES land and other services. Similarly, expert groups such as those for Biodiversity Strategy, Resource use, Soils, Forests etc. will be consulted on existing monitoring needs and the potential of GMES to meet those. An expert group of DG ENV is currently working on Soil sealing and actions to limit or mitigate the impact, and there is a direct interest on the Pan-EU high resolution layer on imperviousness. This should lead to closer consultations with these communities in the future, in order to record specific needs from these thematic areas. The User Forum will be updated regularly on the progress of these activities. In addition to DG ENV, there are several other Directorate Generals that may have valuable links with stakeholder groups, i.e. AGRI, REGIO, MARE, MOVE, ENER, RTD, JRC etc…

As regards the Global Land service, the involvement of international actors (in addition to Member States and relevant Directorate Generals) is also crucial. A dedicated workshop is under preparation and should take place before the end of 2011.

At national level, Member States will need to develop better links among the relevant communities. A clear need for user support, e.g. through training, awareness raising, showcasing and dissemination activities was identified. Several Member states identified the need for developing the skills and national frameworks necessary for making optimal use of GMES products. The Commission will seek to support Member States in these activities.

Access to reference data will be discussed in a dedicated workshop to be organised in 2011.

\(^1\) European Environmental Information and Observation Network