An Update on Land Use & Land Cover Mapping in Ireland

Progress Towards a National Programme

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Presentation Outline

1. Review of Landuse & Landcover (LULC) Mapping in Ireland
2. Deficiencies in existing data
3. Requirements for an Irish national Landcover programme
4. Implementing a National Landcover programme
5. Cross agency landcover working group
6. Next steps
Landuse, Landcover (LULC) and Habitat mapping

- **Landcover** maps describe bio-geographical features of the landscape – Grasslands, Woodlands, Wetlands, etc.
- **Landuse** describes the anthropogenic usage of an area of land – Pasture, Arable, Forestry, Reservoir, etc.
- **Habitat maps** describe in finer detail the vegetation assemblages present on the ground – Dry calcareous grasslands, Riparian woodlands, Mesotrophic lakes.
- Traditional method of producing these maps is by undertaking ground survey which is being replaced by remote sensing techniques where specialised software programs are trained to interpret and classify satellite imagery.
Who is involved in LULC and Habitat mapping in Ireland?

- There is **no mandated authority** on landcover mapping in Ireland.
- In 1995 Teagasc produced the first nation-wide landcover map and a habitats indicator map.
- NPWS have undertaken a number of regional and local scale habitat surveys of SAC’s and other important habitats e.g. the national survey of Upland Habitats and Native Woodlands.
- The Heritage Council have worked with a number of local authorities who have produced habitat maps for part of their regions using the Fossitt 2000 Habitats schema.
EPA’s role in Landcover Mapping in Ireland

- EPA is the Irish National Reference Centre for EEA & GMES related Land monitoring activities.
- Oversaw the production of CORINE 2000 & 2006 for Ireland
- Currently working on the production of Corine 2012
  - Due for release in mid-2014
  - New semi-automated production methodology for Ireland which will reduce the large amount of manual interpretation work involved
  - Will integrate existing in-situ datasets and utilise object-oriented Remote Sensing image classification techniques
- EPA is also working with other national agencies to progress the agenda of an Irish National Landcover dataseries
Deficiencies in Irish Landcover data infrastructure

- There is no dedicated Irish Landcover Mapping dataset or programme.
- In 2010, the NBDC published *Ireland’s Biodiversity 2012, Knowledge gaps.* It identified the following as key gaps in our national bank of environmental data:
  - National Habitat Map
  - National Vegetation Classification System
  - Integrated Land Information Management System

- CORINE is the only continuous, up-to date national landcover dataset.
- CORINE limitations:
  - Pan - European dataset. Classification is designed on central and southern European environments not Irish / North Atlantic climatic zone.
  - Therefore it has unsuitable classification descriptions and breakdowns for Irish grasslands, peatlands and uplands.
  - Coarse spatial resolution. Any landscape feature <25ha or <100m in width is omitted. In particular, Hedgerows, River channels, Transport Infrastructure and Individual housing and farm units are not mapped.
Applications of CORINE

- CORINE is widely used as a core source of data for various reporting, assessment and research purposes:
  - National GHG and carbon stock reporting for Kyoto
  - Catchment based risk assessment studies
  - Strategic Environmental Assessment
  - Local Authority development planning
  - Wildlife and Habitat Conservation
  - Scientific research

- CORINE does not give accurate statistics on landcover and landcover change in Ireland. When used for the above purposes, the results can also be potentially skewed or inaccurate.
## Data Comparison

<table>
<thead>
<tr>
<th>Diffuse Pressure Class</th>
<th>CORINE Total (m²)</th>
<th>CORINE %</th>
<th>Hab Total(m²)</th>
<th>Hab %</th>
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</thead>
<tbody>
<tr>
<td>Urban Land Use</td>
<td>2637582</td>
<td>2.28</td>
<td>2896820</td>
<td>2.51</td>
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<tr>
<td>Forested Land Use</td>
<td>2917391</td>
<td>2.53</td>
<td>21329803</td>
<td>18.47</td>
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<tr>
<td>Nature Land Use</td>
<td>7992486</td>
<td>6.92</td>
<td>1960377</td>
<td>1.70</td>
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<tr>
<td>Wetlands Land Use</td>
<td>8034984</td>
<td>6.96</td>
<td>17688479</td>
<td>15.32</td>
</tr>
<tr>
<td>Water Bodies</td>
<td>0</td>
<td>0.00</td>
<td>363906</td>
<td>0.32</td>
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<tr>
<td>Arable Land Use</td>
<td>1384478</td>
<td>1.20</td>
<td>608176</td>
<td>0.53</td>
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<td>Pastoral Land Use</td>
<td>81492446</td>
<td>70.57</td>
<td>70615345</td>
<td>61.16</td>
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<tr>
<td>Other Agricultural Land Use</td>
<td>11010712</td>
<td>9.54</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Totals:</strong></td>
<td><strong>115470079</strong></td>
<td><strong>100.00</strong></td>
<td><strong>156805471</strong></td>
<td><strong>100.00</strong></td>
</tr>
<tr>
<td><strong>Total Agricultural Landuse</strong></td>
<td><strong>93887636</strong></td>
<td><strong>81.31</strong></td>
<td><strong>71223521</strong></td>
<td><strong>61.69</strong></td>
</tr>
</tbody>
</table>
In comparison with 1 ha Habitats map Corine is shown to under-represent forested areas (2.5 % v’s 18.5%).

This is due to failure to pick up hedgerows and small areas of scrub and woodland.

Smaller peatlands and other wetlands are also not mapped (15.3% v’s 7%).

Over representation of agricultural grasslands due to generalisation to pasture class (81% v’s 62%).

On a national scale, the under-mapping of forestry, scrub, peatlands and other wetlands is very significant in terms of national carbon accounting for Kyoto.
National requirements for LULC data

- EPA conducted a cross agency survey to assess the needs for a national programme and quantify the resources currently being spent on LULC and habitat mapping.

- Resources spent nationally:
  - 22 Organisations responded – National agencies, Universities, Semi-states, Local Authorities.
  - €1.1m expenditure on Land Use & Land Cover
  - 10,000 staff days dedicated to LULC and habitat mapping
  - Clear desire and need for a better quality national dataset

- Legislative requirements:
  - No specific directive or legislation in place requiring a national landcover dataset
  - Landcover data is a key data source for fulfilling a number of legislative requirements.
    - Water Framework directive
    - Strategic Environmental Assessment Directive
    - UNFCCC Kyoto Protocol
    - Surface Water Regulations
    - Habitats and Birds Directives
Main agencies – EPA, NPWS, Teagasc, Forest Service, HC and OSi presented their LULC and habitat mapping work.

Clear outcomes from workshop:
- CORINE does not fulfil the needs of national agencies & researchers.
- Urgent need for upto date national scale data and statistics on landcover, landuse and habitats in Ireland.
- Significant resources spent annually on landcover mapping.
- Degree of overlap between work carried out by various agencies.
- No one agency has the resources or expertise to implement a national LC programme on its own.
- Discussed potential structure and governance options for a national programme.
Establishing a 5 Year LULC Programme

Structure & Governance:

1. Mandated Authority: Central Government to officially mandate & assign a budget to a lead agency, supported by other agencies
2. Shared Service: MoU between relevant agencies to develop LULC Programme, electing lead agency & assign funds over 5 years

Implementation & Resources:

1. Government Agency Landcover Unit
2. Contracted Landcover programme (i.e. Outsourcing)

Financial Costs (Estimated):

<table>
<thead>
<tr>
<th>Options Description</th>
<th>LULC Programme Total 5 Year Cost</th>
<th>Annual Average Cost</th>
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</thead>
<tbody>
<tr>
<td>Option 1 - Government Agency LULC Unit:</td>
<td>€2,191,740</td>
<td>€438,348</td>
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<tr>
<td>Option 2 - Contracted LULC Programme:</td>
<td>€2,498,000</td>
<td>€499,000</td>
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Cross - Agency Landcover Working Group

- Working proposals so far:
- OSi’s Prime2 database should be used as the data baselayer.
- A new national landcover classification schema will be devised to accurately describe and account for the Irish landscape.
- The Prime2 datamodel will initially be populated by existing national datasets such as LPIS and NFI.
- These will be used to map forestry and agricultural grasslands, accounting for 60% -70% of the national landmass
- The remaining areas – the ‘data gaps’ – will be mapped using Remote sensing techniques to interpret satellite imagery.
Landcover Working Group Pilot project

Working on:

- Running test classification on Prime2 sample
- Designing classification schema and methodological approach
- Will make recommendations to the boards of relevant agencies and Departments before end of year on best way forward
By end of 2012 aim to have a prototype classification schema, data and production model for a national landcover map series including:

- High resolution Landcover and landuse dataset (1 - 5ha)
- The CORINE or equivalent EEA dataset which will be produced as a generalised by-product of the national high resolution dataset.
- The dataseries will eventually extend to include a sub 1 ha habitats dataset.

Will propose the establishment of a national landcover mapping programme to be run either by one mandated agency or as a ‘shared service’ between multiple agencies.

Long term programme with a system for updating every 5 years - Not a once-off ‘landcover map’
Arguments for a national programme

- Well defined and agreed need for a national landcover programme. A National landcover map is a key data gap in our understanding of Ireland’s environment.
- Currently over €1.1m and 10K staff days are spent nationally on various un-co-ordinated LULC and habitat mapping programmes.
- A well designed national dataseries would eliminate the need for a lot of this work at an estimated cost of €2.5m over 5 years (€400 – €450K p/a).
- A dedicated national landcover dataset will vastly improve our ability to meet a wide range of national and international reporting and assessment requirements.
Next steps:

- Working group will make recommendations to agency boards at end of year on the ideal production and data model.
- Decision needs to be made at Department level to proceed or not with national programme.
- If proceeding, Department(s) and agency boards need to decide on shared service or single mandated authority approach.
- Budgetary resources of approx. €2.5m needed to be allocated to chosen approach
- Long term programme with plans for a 5 yr update cycle needed
Support to date includes:

- Ordnance Survey Ireland
- An Chomhairle Oidhreachtachta
- The Heritage Council
- Department of Arts, Heritage and the Gaeltacht
- Forest Service
- Department of Agriculture, Food and the Marine
- National Biodiversity Data Centre

Thank You