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OPERANDUM
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Ecosystem service-based approach for evaluating the effectiveness of nature-based solution in mitigating climate change and land degradation issues in a city region

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Presented by
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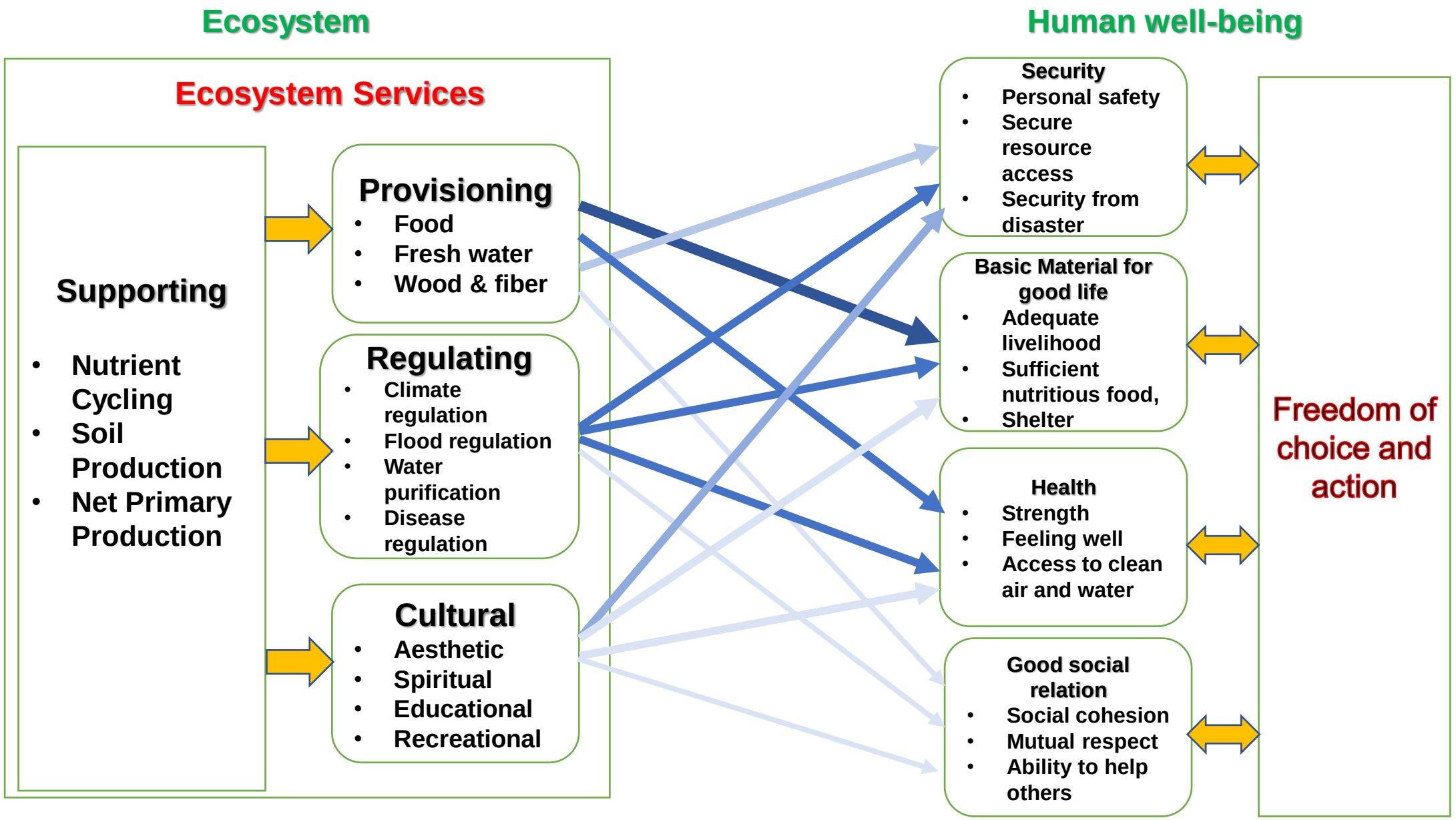

Ecosystem
Human well-being
Ecosystem Services
Supporting
Nutrient Cycling
Soil Production
Net Primary Production
Provisioning
Food
Fresh water
Wood & fiber
Regulating
Climate regulation
Flood regulation
Water purification
Disease regulation
Cultural
Aesthetic
Spiritual
Educational
Recreational
Security
Personal safety
Secure resource access
Security from disaster
Basic Material for good life
Adequate livelihood
Sufficient nutritious food,
Shelter
Health
Strength
Feeling well
Access to clean air and water
Good social relation
Social cohesion
Mutual respect
Ability to help others
Freedom of choice and action

Material and methods: Estimating regional ecosystem service values using adjusted coefficient

$$ESV_j = \sum_{i=1}^{17} E \times EF_{ij} \times A_j$$

$$ESV_i = \sum_{j}^{7} E \times EF_{ij} \times A_j$$

$$ESV = \sum_{i=1}^{17} \sum_{j=1}^{7} E \times EF_{ij} \times A_j$$

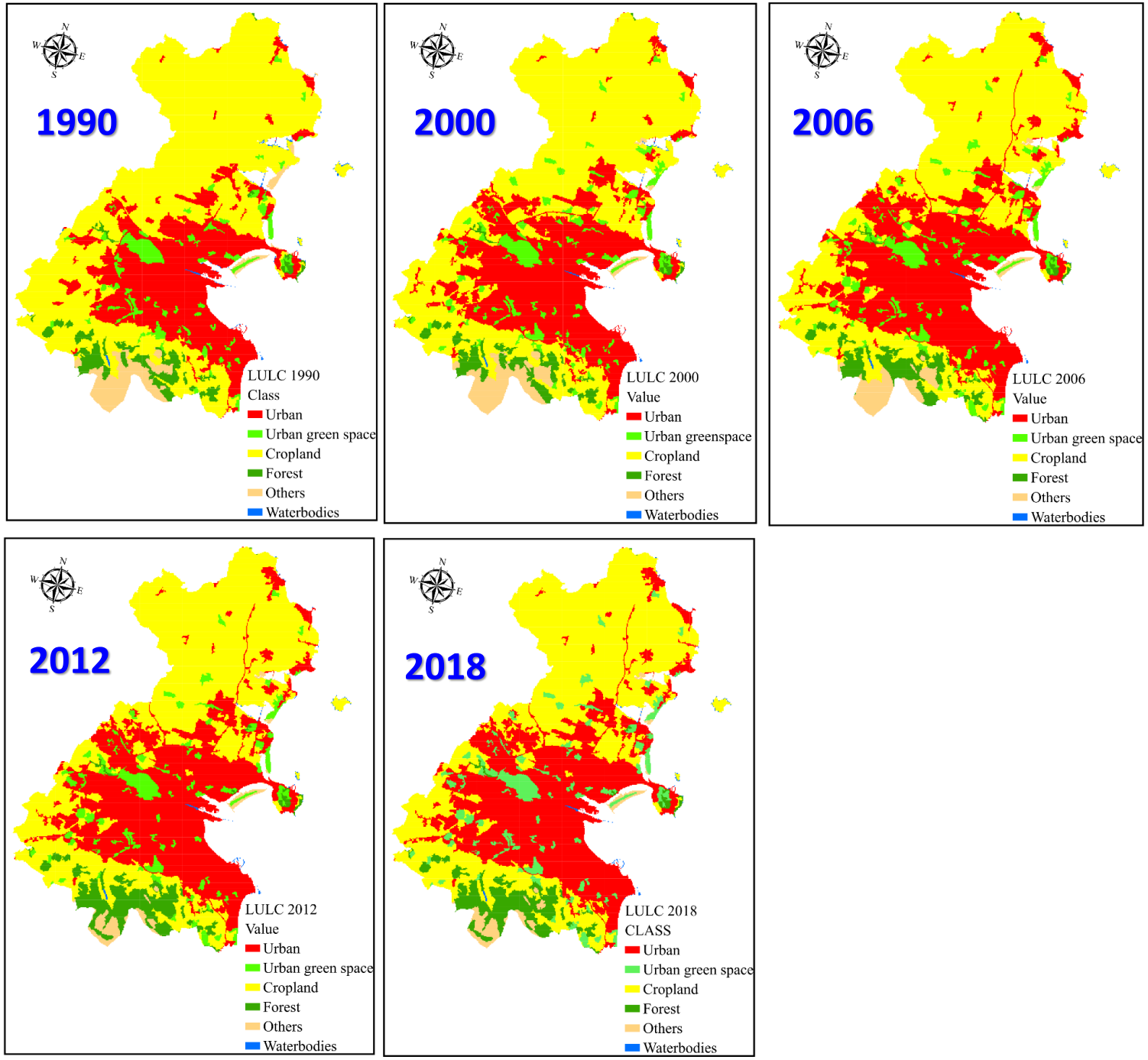
Where, ESV_j, ESV_i, and ESV is ecosystem service value (US$ ha^{-1} year^{-1}) of ecosystem type j, and ecosystem service i, total ecosystem service value, E is dynamic corrected food production service of cropland (US$ ha^{-1}), EF_{ij} is the dynamic adjusted equivalent value coefficient of ecosystem service i and ecosystem types j, A_j is area (ha) of ecosystem type j, respectively

- **Spatial temporal changes of LULC in Greater Dublin region is estimated.**

- **Urban region** has been increased substantially during the study period – 1990 – 2018.

- The study region was classified as six major LULC categories, such as urban land, urban green space, cropland, forest land, waterbodies, and other classes.

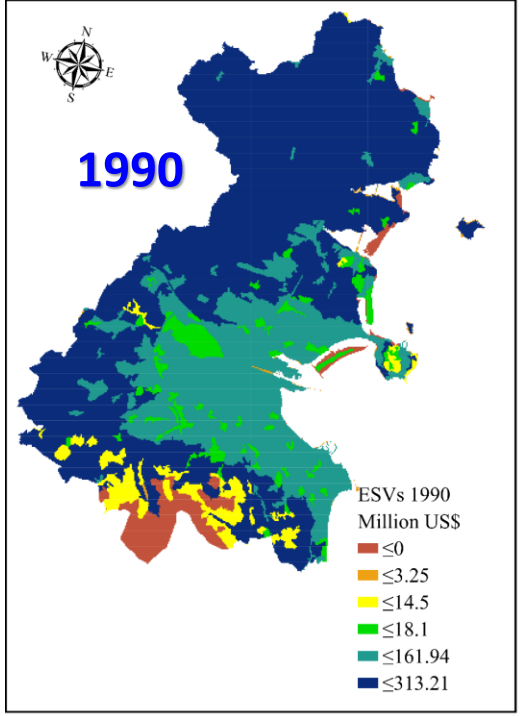
- Waterbodies, urban green space, and forest lands are the main productive land of the region.

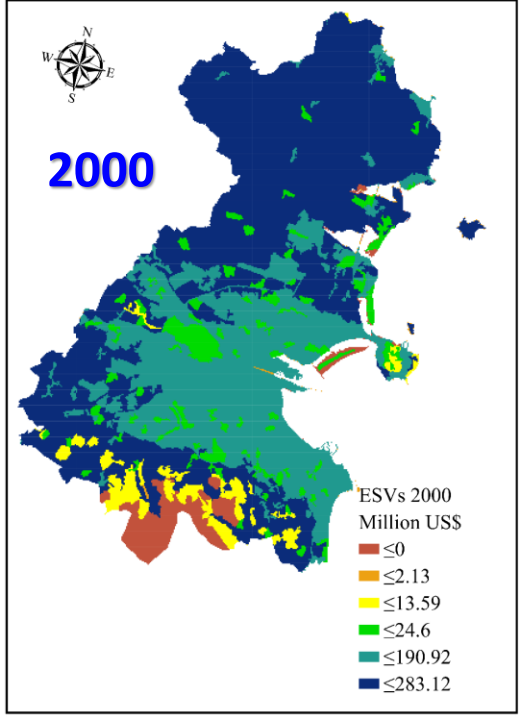


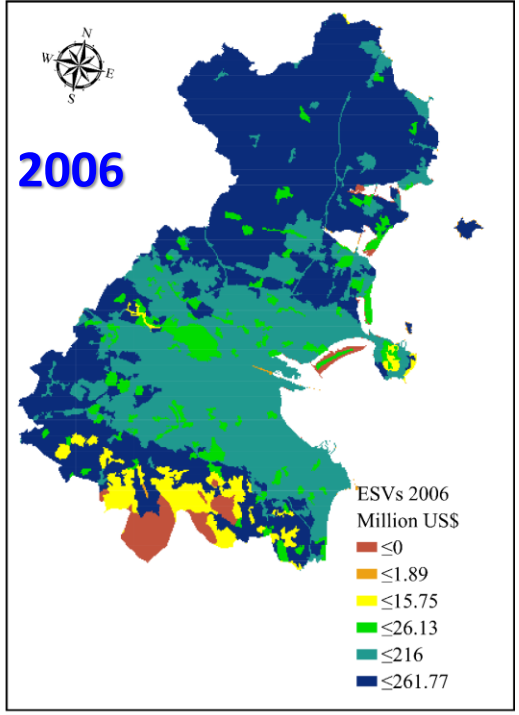
- **Ecosystem Service Values was** estimated for 1990, 2000, 2006, 2012, and 2018 using LULC data.

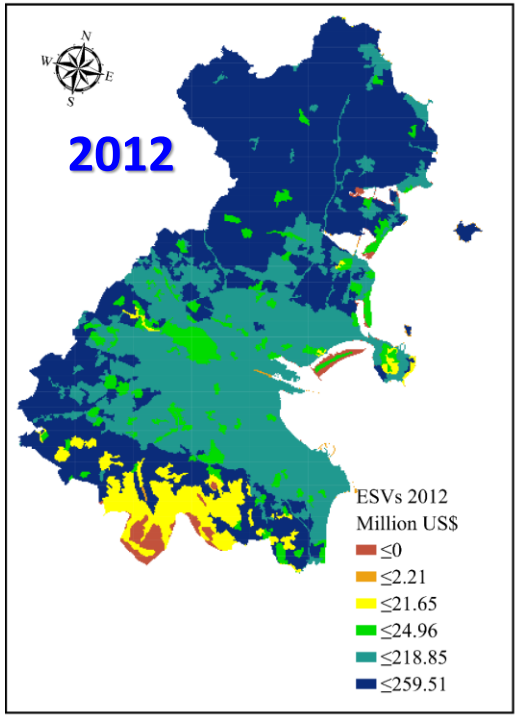
- **Maximum ESVs** was provided by cropland, followed by urban land, and urban green space.

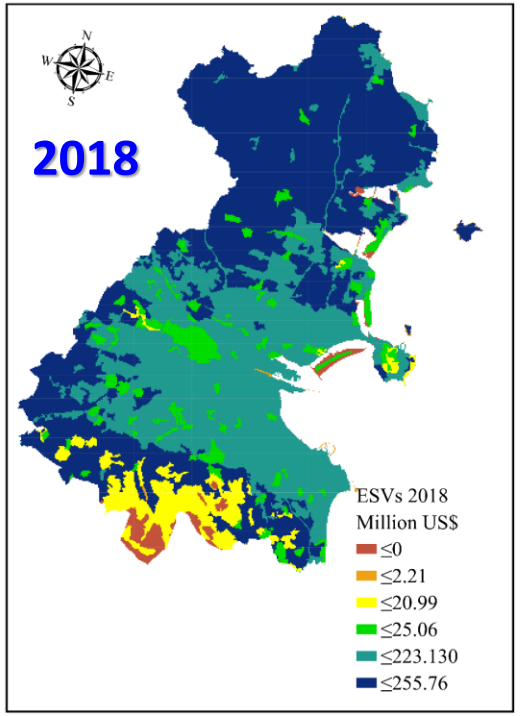
- The changes of ESVs (both positive and negative) are the outcomes of land degradation and conversion of productive land into semi-modified and artificial land.

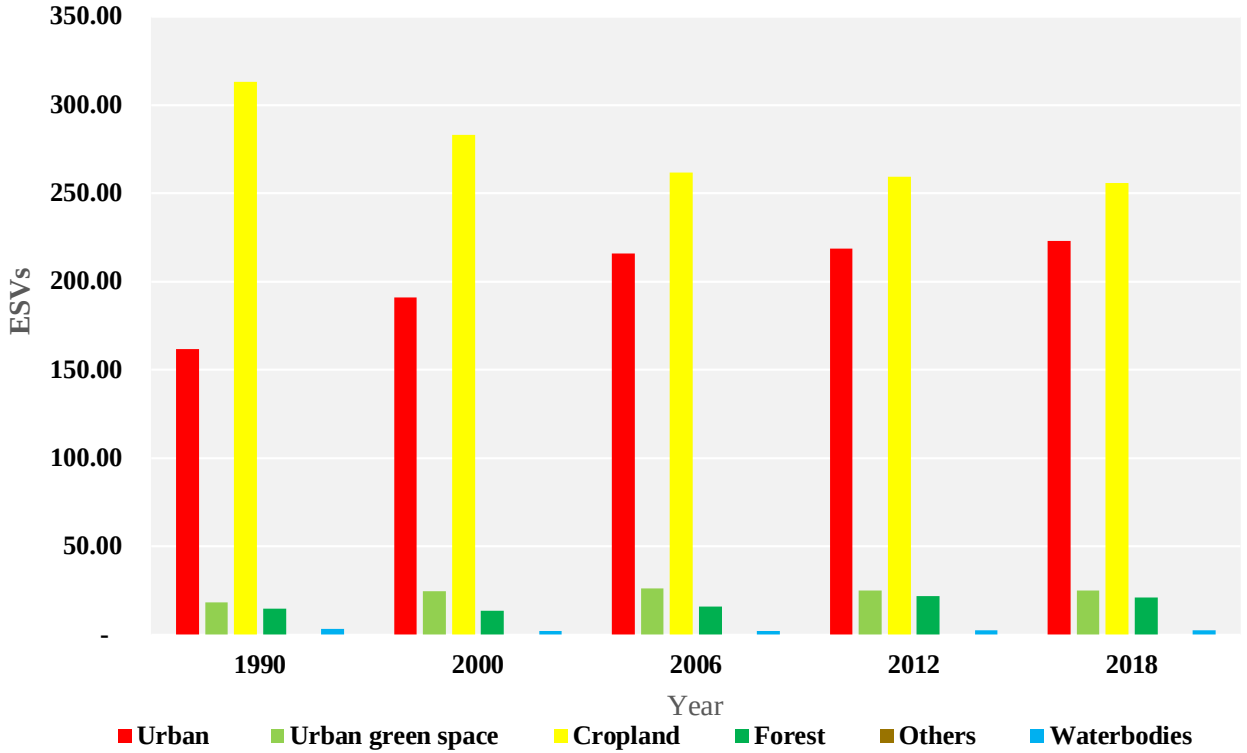


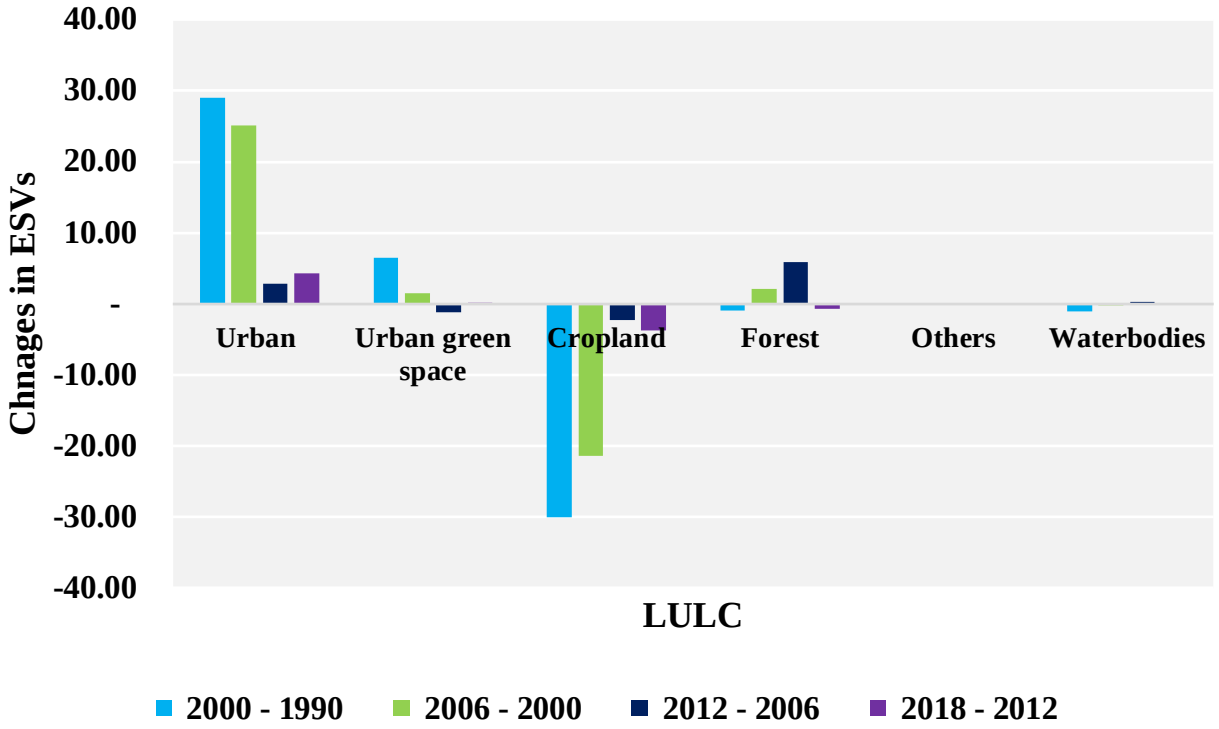












- For all periods, the highest changes in ESVs was observed for urban land and cropland ecosystem.
- Due to the expansion of productive land such as urban green space and forestland, the total ESV's of greater Dublin was increased (16.16 Million US$) during the study period.
- In 1990, the total ESVs (Million US$) was accounted as 511.00, followed by 514.35, 521.54, 527.18, 527.16, in 2000, 2006, 2012, and 2018, respectively.
- The global equivalent coefficient was adjusted and modified by using different dynamic correction factors.