

Ecosystem Services and Natural Capital Assessment of Oxford Island

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What are ecosystem services?

- Ecosystem Services are the benefits provided by ecosystems which deliver material and non-material benefits such as food, water, recreation and aesthetic appeal.
- Include:
 - Regulating Services
 - Provisioning Services
 - Cultural Services



Oxford Island



Oxford Island Marina and Chandlery



Oxford Island



Purpose of the Eco Services research

- To identify, and where possible, to quantify the value of ecosystem services provided by the habitats at Oxford Island National Nature Reserve
- Assess the environmental benefits/costs from habitat creation at Oxford Island and to provide an evidence base for advocacy of such projects
- Learn for the future by identifying ES assessment best practices, further research needed and lessons learned
- Support and inform decision making for future management of shoreline habitats
- Contribute to the limited ES assessment case studies of small-scale managed realignment sites in the UK, this study being the first one to be done for a Council bordering the Lough Neagh shores

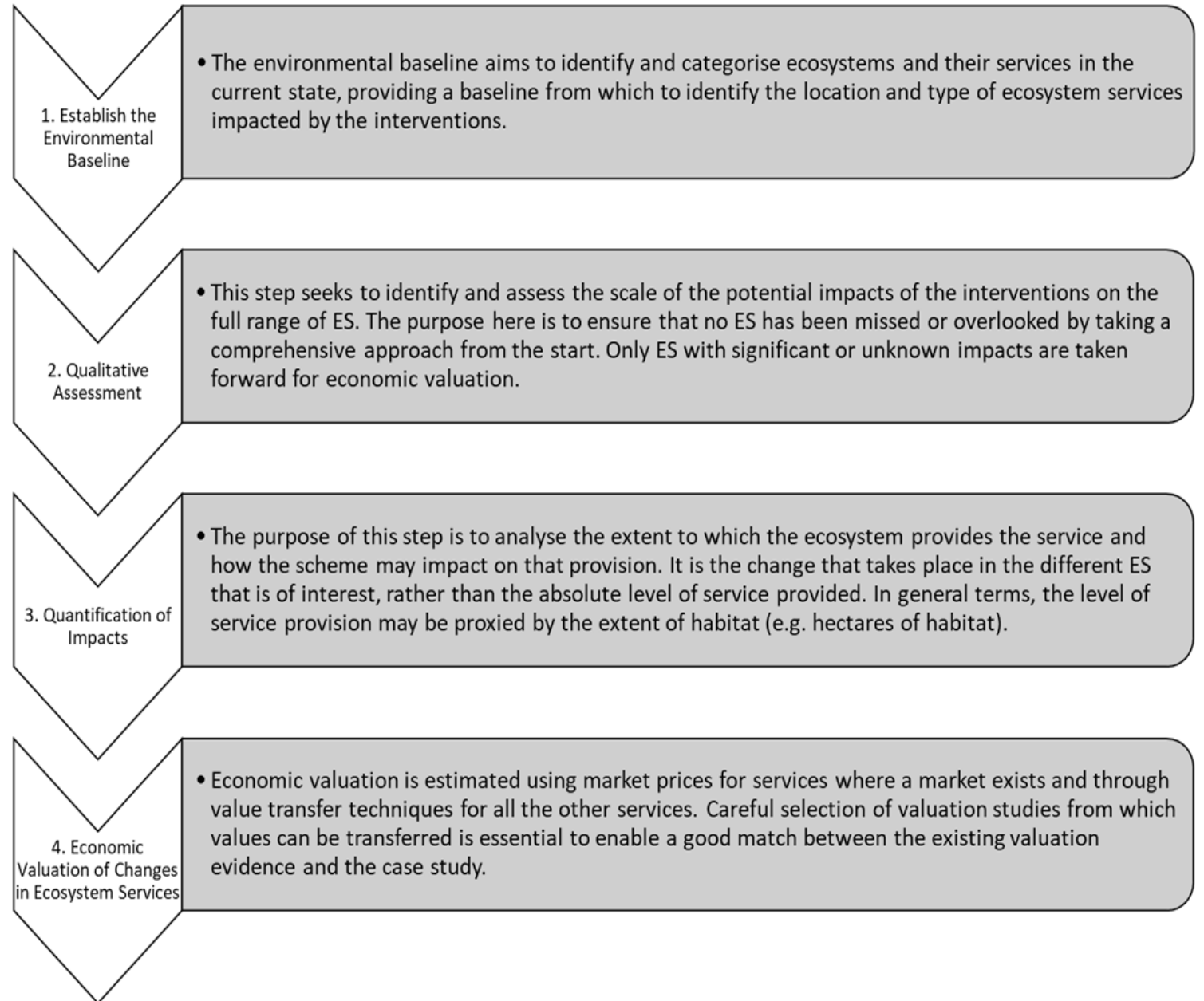
How ES at Oxford Island were assessed

- Where scientific evidence and data were available, the value of ecosystem services has been calculated in monetary terms. In this context, monetary valuation reflects the contribution of ecosystems to aspects of human wellbeing.
- Monetary values have not been considered as a 'price for the environment', but as a means to compare the contribution of different environmental processes, as outlined by the previous speakers today, to human wellbeing.
- Where monetary valuation was not possible, indicative values with associated uncertainties have been determined.
- All values have been supplemented by a qualitative assessment outlining the links between ecosystems and human wellbeing. This qualitative assessment has also been attempted for important ecosystem services where quantitative evidence about their value is missing.

Methodology

This study uses the economic valuation technique of value transfer to estimate the benefits of the environmental changes caused by conservation interventions made by the historical Craigavon Borough Council and the more recent Armagh Banbridge Craigavon Council to lands at Oxford Island since its acquisition in 1967.

ES for which a market exists (typically goods with use value) have been valued by using current market prices.



Eco Systems Services Seminar at Oxford Island Apr 2019



Qualitative Benefits Regulating Services

Services	Marginal Benefit Intervention Assessment	Anticipated Change
Regulating Services		
Air Quality Regulation	The management of the site has not increased dust or other sources of air pollution, relative to the historical baseline. With the introduction of new woodland, windblown dust and air pollution from the close by M1 Motorway has been mitigated through the high-level vegetation acting as a trap for pollutants. Any increase in vehicle emissions due to the changes in management of the land will be very minor and will not impact local air quality which is already significantly better than the national objectives.	+
Climate Regulation	Forests play a major role in the global carbon (C) cycle by taking up inorganic C as CO ₂ through photosynthesis, converting it to organic compounds (biomass), and either storing it in living and dead organic matter (above and below ground: including trees, dead wood, litter, and soil) or returning it to the atmosphere by respiration, decay or fire. The new woodland at Oxford Island is a good carbon sink. Laffoley and Grimsditch (2009) estimate that the long-term carbon storage rate in woodland is 4.2 tonnes/ha/year. Even though any such benefits would be of a very minor scale compared to national and regional emissions, on a local level the increased sequestration of carbon dioxide and methane is significant.	++
Water Regulation	The creation of freshwater habitats has contributed to improving the regulation of water flows on the site. Lough Neagh water levels are regulated by the Department for Infrastructure with flood gates at Toome – these determine the extent to which the peninsula may be subject to flooding. In addition, the flood risk assessment modelling has shown little change to flood risk for the site between the baseline period and the post 1967 interventions with the works creating no adverse impact on the fluvial flood risk. The post 1967 interventions have also created an enhanced supporting function for aquatic ecosystem habitats and flora and fauna	+
Natural Hazard Protection	No known hazards are recorded on the site. Flood data aligns with historical conditions	-

Pest Regulation	A number of invasive species have been discovered at the site, and therefore there is potential for expansion of population without interventions. The historic presence of these is unknown	0
Disease Regulation	Stagnant water prone diseases should be analysed particularly in the light of climate change. Freshwater habitats are however good in preventing microbial diseases. Not seen as having a significant impact with proper management practices in place.	0
Erosion Regulation	Since acquisition of the site any changes in physical processes are confined mainly to the area surrounding the breakwater extending north of the visitor centre with negligible changes elsewhere inside and outside of Kinnego Bay. Since installation the bay morphology appears to have reached a new equilibrium in line with the changes	0
Water Purification	Recreated and managed wetlands have provided a potential significant improvement in natural water treatment (wetland purification processes). Specific treatment wetlands have been created as part of Sustainable Urban Drainage Systems (SUDS) to treat flows from the car park. In addition, there will be a reduction in current negative agricultural impacts to water quality as fertilizer spreading has ceased, potentially leading to improved water quality on the Closet River and wider Lough Neagh Peripheral and therefore contributing to obligations under the Water Framework Directive (WFD).	+
Pollination	There may be a significant change in species diversity for pollinating/pollinated. This has had a significant positive impact.	+

Qualitative Benefits Cultural Services

Cultural Services		
Cultural Heritage	The post 1967 intervention has brought additional cultural interpretation of the site providing education to visitors and celebrating the site's development and international importance. Overall it is considered that there is a significant positive effect.	+
Recreation and Tourism	The site is used by local residents and visitors for recreational activities, including dog walking, cycling, bird watching, etc. The development works have been subject to sensitive management and has enhanced these activities bringing more visitors into the site. Tourism NI indicate between 220,000 and 320,000 visitors now come to the site annually representing a major asset for the Council area	++
Aesthetic Value	An assessment of the post 1967 interventions effects on landscape character and visual receptors during concludes that they have had a beneficial long-term impact on the area's landscape character and visual amenity, through the replacement of a managed, agricultural landscape with a more diverse, sustainable and natural one.	++
Spiritual and Religious Value	Potentially enhanced by the spiritual value of water and increased sense of wilderness	+
Inspiration for Art, Folklore etc	Potentially enhanced by a more diverse and native landscape with new interpretation signs and viewing points attracting more artists, photographers, etc.	+
Social Relations	Potentially enhanced by new farming, educational, recreational and bird watching groups.	+
Education and Research	The post 1967 interventions have provided educational and learning resources for schools, colleges and the wider public where none previously existed. Facilities include interpretation boards, as well as indoor and outdoor classrooms. Education themes include land management for wildlife, agricultural use associated with freshwater/wetland habitats, shoreline evolution and climate change. Further research opportunities for valuing wetlands, shoreline ecological change, etc.	++
Employment	At present, employment opportunities on the peninsula are principally linked to Council activities. Private and voluntary sectors make wider use of the new environmental assets supporting further jobs through engagement with local communities, visitors and organised groups.	++

Qualitative Benefits Supporting Services

Supporting Services		
Soil Formation and Retention	The majority of the managed site has seen soil enrichment through increased organic matter especially within the woodland areas creating environments sought for a more diverse, woodland based ground flora	+
Primary Production	The creation of a more complex/varied habitat has led to enhanced assimilation and accumulation of energy and nutrients by organisms, potentially improving primary productivity.	+
Nutrient Cycling	The creation of new habitats has enhanced nutrient processing while significantly reducing the input of fertilizers formerly applied to converted agriculture land. Equally applied to seasonally inundated grassland in freshwater area.	++
Water Cycling	Wetland habitats are efficient in recycling water at local scale and it is therefore believed a moderate net change from current land use.	0
Photosynthesis	Oxygen generation has not been quantified. There is possibly of an increase from a more complex/varied habitat especially with tree and hedgerows planting.	?
Provision of Habitat	Habitat creation is the main driver for this site aiming at increasing local biodiversity. Mitigation strategies have been put in place to protect legally-protected	++

Quantitative Economic Benefits

- **Climate Regulation** Annual benefit = £210,146.00
- **Water Regulation** Annual benefit = £5,376.00
- **Recreation and Tourism** Annual benefit = £1,976,436 to £2,807,789 per annum
- **Education** Annual benefit = £9,800
- **Provision of Habitat** Annual benefit = £125,240 to £182,467
- **Total annual benefits** £2,326,184 to £3,214,764

Tools for Future Projects

- Give real economic value to conservation on site
- Assist ABC Council to monitor new data and justify funding expansion
- Assist LNP develop new Water Catchment Plans in East of Lough Neagh
- Develop Nutrient Management Plans in new Environmental Farm Scheme
- Develop new EU Life Plus proposal using site as a pilot