http://www.taoiseach.gov.ie/eng/News/Government_Press_Releases/Submissions_invited_on_developing_Ireland%E2%80%99s_Bioeconomy.html

Submission: Supporting the development of Ireland's bio economy through ecological reanimation

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Ireland's natural resources are inextricably linked with many interdependencies. The biologically-dependent economic and social potential of the Country far exceeds that which might be developed from bio economy (biotechnology) alone. While current, initiatives across many fields of natural resource endeavour have potential, few address the substantive linkages that exists between them and upon the ecosystems on which they depend. There is clearly a need for an integrated approach by which supporting land and water based resources are more optimally explored and managed. The development of a thriving bio economy will fare best when technical resources and competencies are seen and managed along with that of their supporting land and water based ecosystems.

Addressing the concatenation that exists between the Country's social, economic and environmental needs requires understanding of the connectivity that exists between them and the natural environment, accepting the **"…….underlying principle…. that social and economic factors will override natural factors unless the public is educated to understand the relationship between nature and their own long-term welfare."** (F H Bormann 2008, Yale School of Forestry and Environmental Science) – the focus must therefore be to create, utilise and reuse resources that better address customer and societal needs in ways that fit the natural biogeography of the Country (its climate, location, geography, soils and biology).

All economies are fundamentally linked to their biogeographical location and the integrity of their ecosystems. Developing an enterprising bio economy would substantially benefit from the reanimation (**see below for definition**) of Ireland's greatly diminished and once most important ecosystems, forests and wetlands - with coherencies to reflect the Country's social, economic and environmental needs. The lands and waters of Ireland have far greater inherent potential resource capacities than current agriculture, forestry and water-based enterprise permit (pastures today, supported by high nutrient inputs and intensive management, comprise but c. 10% of their floral-diversity found 50 years ago - different pastures and their associated flora impart different qualities to milk, and different cattle/sheep/goat breeds have different meat and dairy characteristics; the current timber industry largely depends upon but one tree species, Sitka spruce - more than 400 tree species can be grown in Ireland, each with their own specific timber characteristics and values, horticulture's potential too is considerable but under developed; the recent EPA report on the water quality of rivers and streams, and current status of Atlantic salmon and trout along with other indicators suggests a need for alternative land and water use strategies). Currently Ireland's aquatic and terrestrial natural resources and associated biological diversity are dominated by many formulaic methodologies and tic-a-box compliances that are often focused on prejudged criteria driven by grant aid. Changes to the way they are managed are greatly needed.

Other forgone resource opportunities:

1. **The underperforming manner in which Ireland engages in the circular economy**, e.g. in the management of non-hazardous municipal and water treatment sludge wastes (capable of growing a range of specialist crops and aiding in the protection of soil and water resources). Limited understanding of the nature and potential use of such materials limits their innovative application.

2. **Water treatment and management** (including that for flood attenuation) are currently dominated by expensive 'hard engineering' such as conventional electro-mechanical methodologies and concrete structures. Alternative approaches, developed through ecological reanimation such as the Integrated Constructed Wetland (ICW) concept have been shown to provide substantial savings in capital (c. 60-70%) and in operational and maintenance (c. 90-95%) while also providing many ecosystem services such as carbon sequestration (c. 13-16tdw/ha/yr.), amenities, biological diversity amongst others. There are currently more than 100 demonstrations of ICW systems in Ireland successfully treating a range of polluted water sources including that of municipal waste water, mine drainage water, farmyard waste water, single-domestic wastewater. This Irish success has recently been deployed in Northern Ireland, England, Spain and Portugal with interest shown from Australia, New Zealand, USA and PR China.

A national statement is unlikely to inspire let alone achieve many benefits for the bio economy in Ireland, better that the Department of the Taoiseach and other relevant Government Departments, and State agencies facilitate innovative examples of what can be done – supporting original enterprise and entrepreneurial endeavour, promoting and linked to reanimating lost natural ecosystems from which not only novel biotechnology can flourish, but provide a wealth of hitherto forgone resources and services – examples of which are:

1. **Attenuating flood waters** for rural and urban communities that are largely self-financing through the reanimation of wetland and forest intercepting ecosystems.
2. **Sequestration of carbon** at superior rates to that of all other existing land management methods but without precluding the potential of reuse of some the sequestered carbon as fuel, effective nutrient recycling and use as bio-char for soil enhancement.
3. **Diverse tree species for specialist end-use purposes** using integrated establishment methods enhancing nutrient capture and reuse. This is of special significance for rural economies that could avail of specialist local industrial development.
4. **Specialist crops for pharma industries**, fruits and vegetables
5. **Specialist milk and meats** using specific fodder crops and livestock
6. **Recognising that evolutionary processes are in the first instance the basis for the establishment of the diversity from which the 'bioeconomy' can develop in the first**

instance - and that by diversifying and reanimating biological diversity and their dependent ecosystems, many ecosystem services of economic and social significance may be developed.

References and supporting information:

EPA Catchments Newsletter May 2017 (Pages 19 - 21)

https://www.catchments.ie/ecosystem-hydrology-utilizing-functional-ecology-forests-wetlands-acknowledging-benefits-multiple-land-use/

Download link to EPA Catchments Newsletter Autumn 2017 (Pages 15 – 17).

https://www.catchments.ie/download/catchments-newsletter-sharing-science-stories-autumn-2017/?wpdmdl=1982&ind=XUi2MXkGfeYOo3TN7Ta0ff0yrGTCqQp9PagoJo7eioqH-QPZdLQK05SVhAjmuG68_fGYMpNtlAjyRVFbYIralhht1nTNZQSTHsaWDNsT_LOfeoi-ZD7NCNVEtqWNEqPG

FAO Forestry Presentation (Direct link to PDF file).

https://www.unece.org/fileadmin/DAM/timber/meetings/20170627/Sess._IV-1-Harrington.pdf

Ecological reanimation focuses on facilitating **bio-geo-chemical processes** delivering sustainable self-managing (and self-facilitating) systems minimising 'leakiness' and entropy.

Ecological restoration focuses on facilitating lost **biological assemblages** (within recent evolutionary time lines).