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# Policy Brief: The Value of Natural Capital

## Executive summary:

There is an increasing recognition that urban development cannot proceed unchecked; to maintain the integrity of the surrounding rural landscapes urban sprawl must be controlled and urban green spaces protected. Ensuring the continued functioning of natural ecosystems is directly relevant to human welfare as health and society is dependent on services provided by the environment for free. However, the competing demands of society mean that some development must occur. Balancing these two competing issues is of critical importance to urban planners in the Zürich metropolitan region; Zürich's success and economic prosperity is dependent on maintaining its extremely high standard of living, itself dependent on the natural capital of the city. Development must therefore be sustainable. In this policy brief we propose that 'natural capital' is explicitly incorporated into urban-planning decision making processes to ensure that urban planners can accurately, and transparently, assess the relative merits of development against environmental costs.



## What is ‘Natural Capital’?

Capital, in an economic sense, is the value of money or other assets owned by an individual or corporate entity. Using the same principle, ‘Natural Capital’ is the value attributed to nature and natural landscapes. It is clear that natural systems have financial value, most obviously from directly extracted resources such as metal ores, or plant and animal food sources, which have a market cost. The provision of raw materials and food items is an example of an ‘ecosystem service’: ecosystem functions that provide human benefits, directly or indirectly. However, there is an increasing recognition that we also benefit from previously intangible ecosystem services provided by the environment. For example, we all benefit from climate regulation and clean air, although we have never had to pay for these ‘common goods’. These ‘ecosystem services’ can be divided into four categories: provisioning, regulatory, support and cultural services.



### Provisioning Services

- The materials and goods which we directly extract from the environment. E.g. fresh water, food and raw materials



### Regulatory Services

- The services ecosystems provide by acting as environmental regulators. E.g. freshwater purification, climate and air quality regulation



### Support Services

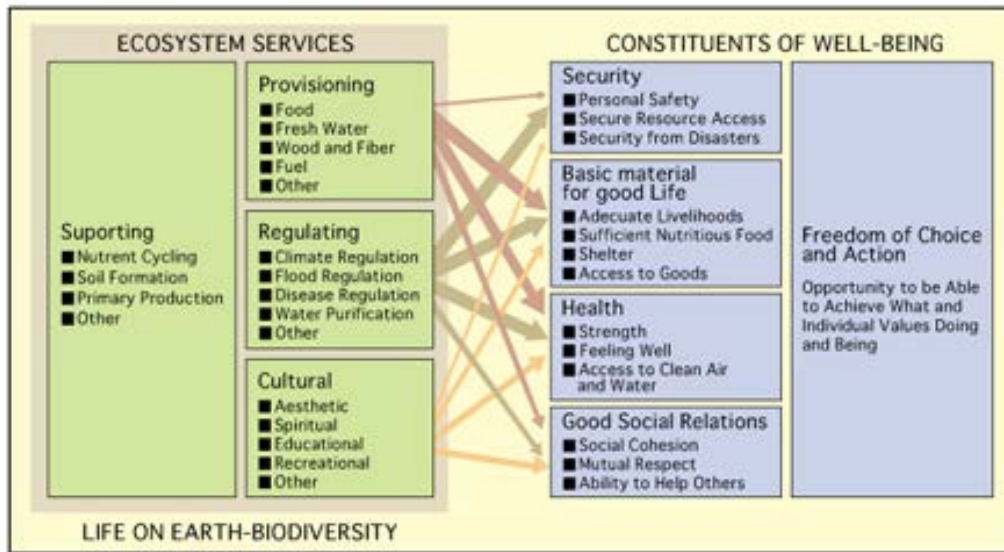
- The ecosystem functions and properties that underpin and support all other services. E.g. nutrient cycling, maintenance of genetic diversity



### Cultural Services

- The non-material benefits that we derive from natural landscapes and nature in general. E.g. aesthetic, spiritual or recreational use

Human societies are therefore dependent upon ecosystem services, and human actions cannot therefore be viewed in isolation from the corresponding potential environmental impacts they might have. A functioning and resilient ecosystem is required for economic prosperity and human health. Maintaining healthy ecosystems is more urgent because of global climate change. The links between ecosystem services and human well-being is shown in the following diagram.



Source: the Millennium Ecosystem Assessment

## Why consider 'Natural Capital' in urban- and spatial-planning

A number of independent assessments have determined that human use of the environment is not sustainable. For example, 60% of ecosystem services assessed by the Millennium Ecosystem Assessment were classed as degraded or exploited unsustainably. The greatest driver of ecosystem loss is land-use change. In Europe, urbanisation and industrial growth has caused high land consumption rates and associated loss and degradation of natural ecosystems, especially in and around cities. In Switzerland, urban land increased by 27 km<sup>2</sup> during the 1980s and 1990s. Maintaining and enhancing natural capital in and around urban areas can significantly contribute to improve the provision of municipal services, improve public health and help lower the cost of energy. Controlling this 'urban sprawl' and conserving some natural areas is therefore beneficial. Some countries, for example the UK, have introduced 'Green belts' to do just this. However, policy makers must still act with society's best interest which necessarily means that some development must occur. Development and growth can only be achieved via a series of trade-offs with land conversion. Urban planners must therefore adopt valuations of natural capital as a way of critically assessing the benefit of a development over the cost of the ecosystem services lost.

*Important Urban Ecosystem Services include:  
Air quality regulation, water regulation, local climate regulation,  
cultural heritage, aesthetics, recreation, education*

## Relevance to Zürich

Zürich, Switzerland's largest city is an internationally important financial centre. This industry is crucial for the city's economy, accounting for one in five jobs. Zürich's success is dependent on the strong 'brand' that it has developed, which promotes the city's very high standard of living, strongly linked to surrounding natural environments. Easy access to parks and recreational spaces, including the Zürichsee, and its proximity to alpine landscapes are critical to ensuring a happy, productive and healthy population. This 'natural capital' is therefore critical to the high standard of living and economic prosperity of the city; if access to 'green' recreational areas is reduced or the wider natural environment is degraded Zürich's standard of living will fall, potentially with economic repercussions if the city loses intellectual capital and no longer supports a buoyant financial sector. On this basis we propose that natural capital be explicitly included into the decision-making framework for urban- and spatial-planning for the Zurich metropolitan area.

## Valuation of natural capital

To critically assess the relative merits of land development compared to the costs of its degradation we need to be able to compare each using the same units. The Total Economic Value (TEV) framework is a conventional approach to value natural resources and ecosystem services. In essence, it gives a direct monetary value to the various goods and services provided by ecosystems by partitioning these services into categories which are understandable within the context of the current economic system (Table below).

Categories	Description	Example
<b>Direct use value</b>	The value of resources directly extracted or harvested from the ecosystem; the value of industries reliant on a specific habitat/ geographic feature. These values can generally be obtained from their market prices	Commodities, such as the timber value from logging one ha <sup>-1</sup> of forest. Equally, the value of a kayaking industry on a stretch of river
<b>Indirect use value</b>	The value of services that support other economic activities	Pollination of crops by insects; natural pest control
<b>Option use values</b>	The value of protection/preservation of the current ecosystem in its current state so that its' resources can be used in the future	Protection of tropical forest plant diversity for future prospecting for chemicals with medicinal uses
<b>Non-use values</b>	The value of the ecosystem separate to any direct or indirect use value. Often referred to as the 'existence value'	Habitats with aesthetic or spiritual value, for example sacred forest groves

However, other indirect methods can be used. For example, values can be estimated by comparing the cost needed to replace ecosystem services lost with alternative engineering solutions, or ‘stated preference’ values where people are directly asked how much they would be willing to pay for a service or to avoid its degradation.

### Integration of evaluation methods into planning decision-making

The most cost-effective combination of measures should be applied after a cost-benefit analysis or comparable procedure to achieve the desired result in the lowest cost possible. In any case:



**The benefits should be balanced by the costs:** value the benefits in monetary terms and use this as a reference to make comparisons with the costs towards an effective decision making.



**Raising public awareness and consultation** is important to promote public contribution towards the aims set.



**A combination of expert knowledge translated in policy terms** is critical point so that the administrations officials and consultants involved can effectively advise and contribute from the policy perspective.



**The methods used to value natural capital should be transparent and documented.**

### Meeting policy commitments

Switzerland acknowledges that unrestrained urban development comes with environmental costs. A number of existing policies and programmes have been implemented, particularly to counter urban sprawl, such as revisions of the Regional Land-Use Planning Law and the Swiss Landscape Monitoring Programme (LABES). Also, by law, “construction projects are only approved, subsidised and implemented if they are justified on important public interest grounds, and only on condition that they are optimally fitted into the landscape” (SAEFL, 2003).

We argue that to explicitly meet these policy objectives, and to justify development in a robust and transparent way, natural capital must be incorporated into planning decision-making processes.

Other policy bodies accept this ideological shift. The European Commission states in its 'Roadmap to a Resource efficient Europe' that natural capital and ecosystem services must be "properly valued and accounted for by public authorities and businesses", and sets an implementation goal of 2020. Valuing the environment for the services we obtain has therefore become an accepted agenda in conventional politics.

### Case Study 1



The London rivers action plan (UK), a tool to help and restore rivers for people and nature.

"A strategy for restoring rivers in North London" (2006) and "River restoration - a stepping stone to urban regeneration highlighting the opportunities in South London" (2002). These strategies have been very successful in stimulating river restoration across the London area.

This plan will build upon their success and look for river restoration opportunities that will benefit people, businesses and wildlife by putting river corridors at the heart of regeneration and renewal through the enhancement of riverside parks, green spaces and the built environment.

(<http://www.therrc.co.uk/lrap/lplan.pdf>)





### Case Study 2



Improving ecosystem service provision: planting trees in Bristol, UK. The city of Bristol, in the south-west of England and the same size of Zurich, has organised a 'Bristol Tree Forum' which acts to enhance the urban natural environment, ensure a sustainable balance between built surfaces and canopy cover, and plant new trees. Working with the charity "Trees for Cities", Bristol Council has planted over 6,700 trees with the help of local communities to rejuvenate the cities green spaces.

### Case Study 3



A hedonistic approach was used to explore various models for estimating the values of Lake Monroe and Candlewood Lake in the US. As Lake Monroe also serves as a reservoir, lake levels fluctuate and lakefront property gives no additional value. Candlewood Lake has stable water levels and lakefront property is more valuable than would be predicted under the traditional model that incorporates distance to the body and view of the lake. Adding waterfront adjacency to the model adds an important element to the valuation. The amenity value of adjacency included in the model with distance and view increases Candlewood Lake's total annual value by 20%, to \$8.9 million and does not change Lake Monroe's annual value (\$2.4million). In no way does we suggest that the exact values found for either of the above lakes should be applied directly to Lake Zürich and the surroundings. This case highlights the importance of context specific modeling and inclusion of amenities.



### **Recommendations:**

*The lake of Zürich is well managed and conserved and its surroundings still harbor natural landscapes such as big patches of forest. But demography is growing, and demands in housing around the lake are likely to increase continuously. It's therefore important to calculate the natural value of this lake in the most precise way and assess the area that is still available e.g. for building more houses or recreational areas. Among the aspects to take into account when it comes to value different policy options, we call attention to the size and frequency of corridors that are necessary to be conserved between the lake and other natural landscapes in order to protect animal and plant dispersion, and hence keep diversity high.*

### **Conclusion:**

*Natural capital should be incorporated into planning decision-making processes. This is a necessity to ensure the continued provision of beneficial ecosystem services to urban populations. If a number of green-field sites can be used for new developments those with the green-field site lowest natural capital value should be preferred. Additionally, a model for valuation should be particularly careful not to overlook any pertinent variables specific to Zürich at the local, regional, national, and international levels.*

### **Recommended further reading:**

- Millennium Ecosystem Assessment (2005). *Ecosystems and Human Well-being: Synthesis*. Island Press, Washington, DC.
- TEEB (2010). *The Economics of Ecosystems and Biodiversity for Local and Regional Policy Makers*. Edited by Heidi Wittmer and Haripriya Gundimeda. Earthscan, London
- European Commission (2011). *Roadmap to a Resource efficient Europe*. COM(2011)571
- Swiss Agency for the Environment, Forests and Landscape (SAEFL) (2003). *Landscape 2020. SAEFL's guiding principles for nature and landscape*. Bern.

*This resource was written 2012 by: Juliette Chamagne, Theofania Patsiou, Janielle Porter and James Smith during the course 'Evidence-Based Policymaking', Zurich-Basel Plant Science Center (PSC) ([http://www.plantsciences.ch/education/science\\_policy/courses](http://www.plantsciences.ch/education/science_policy/courses)) under the supervision of Holger Gerdes, Ecologic Institute and Andrea Pfisterer, PSC*