

Urban Biodiversity, Economics & Ethics

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Abstract

It might be reasonable to make a distinction about cities with regard to biodiversity: There are cities that are green, and there are greens that are urbanized. The former are highly sophisticated cities with strong economic infrastructure. These cities are not happy with the grey buildings and concrete structures, and they hold green campaigns to reproduce biodiversity. There are some other cities that are built in jungles or wetlands. These cities have literally attacked the biodiversity by unplanned encroachment. These are especially common in Southeast Asia where urbanization is relatively young. The sustainability triangle is very well known in urban planning. It points to the conflict that arises from economic, social and environmental perspectives in regard to urbanisation. From the economic perspective, the cities are considered to be the engine of growth as they are the seat of industries, service sectors, and ICT companies. Most of the time, the success of a city government is measured by economic performance indicators such as the increase in foreign direct investment or the number of high rises etc. From the social corner of the triangle, rapid urbanization, informal housing in outskirts, grassroots democratization initiatives, crime rates, access to municipal services etc are hot topics. As the cities are growing formally through projects led by the construction sector and informally through the growth of slum dwellers, various ethical dilemmas emerge that pit urbanites against the urban flora and fauna. After presenting some of these ethical dilemmas, this paper proposes an ethical framework for urban biodiversity including *Homo sapiens*.

Contents

- 1) An Overview of Urban Biodiversity
- 2) Threats to Urban Biodiversity
- 3) Ethical Dilemmas Involving Urban Biodiversity
- 4) Recommendations
- 5) Conclusion

1) An Overview of Urban Biodiversity

Biodiversity involves species diversity, habitat diversity and genetic diversity (Hostetler & Main 2010a, 2010b). The main policy guideline on biodiversity is the Convention on Biological Diversity (CBD) (1992, Rio de Janeiro). It has been ratified by 191 countries (Müller & Werner 2010). Unfortunately, CBD views biodiversity as a mainly nonurban issue, although the urban impact on biodiversity in the cities and out of the cities is getting stronger and stronger (Müller & Werner 2010). Puppim de Oliveira et al. (2010) state that 3 levels of interaction exist between cities and biodiversity. The first is urban biodiversity which involves impact of human settlements over biodiversity of the cities. The second is 'regional biodiversity influence' which refers to the fact that urban human life affects not only urban biodiversity but also biodiversity surrounding the city. Thirdly, 'global biodiversity influence' involves the impact of cities over far distant lands, as cities are the centers of global consumption. At another level of analysis, 3 main research areas and policy topics emerge out:

- 1) The influence of cities and people over biodiversity.
- 2) The influence of biodiversity over cities and people.
- 3) Which biodiversity to preserve? (Puppim de Oliveira et al 2010)

It is obvious to the experts -although not always to the urbanites- that urban biodiversity provides ecosystem services and other benefits such as clean air, parks, refreshment etc. However, along with the benefits, urban biodiversity may also lower urban quality of life as in the case of mosquitoes, invasive species etc (Puppim de Oliveira et al 2010). (Petersen et al (2007) provide a comprehensive list of ecosystem disservices, along with ecosystem services.) That is why a third question is also necessary. In some other cases, urban biodiversity preservation can be detrimental to local people earning their subsistence by natural resources, if their needs are not addressed at project, program and policy levels.

Puppim de Oliveira et al. (2010) state that preserving urban biodiversity is not enough, as urban settlements also affect neighboring biodiversity as –e.g.- urban demand for food leads to deforestation of surrounding areas, since urbanization commercializes subsistence activities of exurban food producers. Another example provided by Puppim de Oliveira et al. (2010) in that sense is wild species trade in Vietnam and elsewhere.

Puppim de Oliveira et al. (2010) point out that urban expansion is mainly formal in cities of ‘developed’ countries, while informal in ‘developing’ countries. Furthermore, the latter is faster than the former in expansion. Urban sprawl and suburbanization are the main problems of the former where compact cities is the recommendation. Informal settlements are the main problem of the latter where low-cost housing and pro-poor planning policies are the recommendation.

Puppim de Oliveira et al. (2010) present an archetypical case in Mumbai where Sanjay Gandhi National Park which is one of the largest metropolitan parks of the world is encroached not only by the informal settlements of the poor, but also large bungalows of the wealthy encroachers. The judiciary decided to evacuate poor people, but did not touch the wealthy encroachers. As correctly stated by Puppim de Oliveira et al. (2010), decisions like this don’t solve the problem, but relocate it, as poor people are moving to nearby areas to build their slums, much in the line of David Harvey’s statement: “Capitalism never solves its problems, it just moves them around” (Harvey 2010). Puppim de Oliveira et al. (2010) suggest pro-poor planning and proper housing policies as solutions. The discussion of the case leads to the idea that environmental ethics is a luxury item for poor people, as they are on survival mode. Many of the informal settlers were displaced or dispossessed and moved to cities (cf. Tides Foundation 2009). Thus urban biodiversity discussions and accompanying ethical issues are not only urban but also exurban.

As especially low and middle income countries rapidly urbanize, cities appear as the focus of various environmental and social problems, since the urban demand for natural resources and ecosystem services is a dramatic driver of depletion of natural resources (Wu 2008), as stated above. Rapid urbanization is in low and middle-income countries, and these countries are high on biodiversity (Müller & Werner 2010). Thus global urbanization trends are relevant for biodiversity issues by definition. We can’t stop urbanization, but we can design and plan better cities (Wu 2008). Wu (2008) states that “[u]rbanization should not be viewed merely as a cause for environmental problems, but also as an inevitable path to regional and global sustainability. Cities have lower per capita costs of providing clean water, sanitation, electricity, waste collection, and telecommunications, while offering better access to

education, jobs, health care, and social services. At the present, urban areas are home to more than 50 percent of the world population, while accounting for less than 2 percent of the earth's land surface" (p.46-47).

Converging with Wu (2008)'s balanced approach, Kraas (2007) discusses not only negatives, but also positives relevant to cities and ecological issues. Kraas (2007) lists the following as the ecological dimension of 'problems, risks and disadvantages' of mega-urbanization:

- Urban expansion, urban sprawl and fragmented land use mosaic
- Air, water, soil pollution, sewage water problems
- Waste disposal; uncollected, illegal and toxic waste
- Inundation and land subsidence
- Environmental health problems
- Expansion in ecologically fragile areas (e.g. coasts, slopes, mangroves)
- Sealing and degradation of fertile soils' (Kraas 2007:14).

On the other hand, Kraas (2007) states that mega-urbanization has its 'benefits, chances and advantages' in ecological dimension such as:

- Decreased land consumption (per head), partly through high-rise construction
- Optimised land use patterns, efficient land use planning
- More efficient resource use (e.g. water, food, energy)
- Closure of material, water, energy flows (recycling)
- Comprehensive monitoring and management of nature-human interaction
- Diversity and management of urban biodiversity (biocorridors, habitat diversity)
- Sustainable urban agriculture and green space policy' (Kraas 2007:14).

The traditional approach to urban biodiversity is based on the assumption that distance to the urban center is negatively related with biodiversity, since it provides a continuum of human disturbance of nature. Urban fringes are considered to be more biodiverse than the city center (Müller & Werner 2010). However, Strohbach et al. (2009) found that urban biodiversity (in the case of avian (bird) biodiversity) was a function of land use (urban green space) and socioeconomic patterns (population density, income, and unemployment) in Leipzig. Districts with high SES are species-rich, while low SES districts are species-poor; and districts with high population density are low in biodiversity. Of course, these findings may not be readily applicable to other cities, as species-poverty in Leipzig may mean species-wealth in other cities with lower biodiversity thresholds (Strohbach et al 2009). That is why each city needs its own biodiversity research. There is no ready-made template for urban biodiversity. Nevertheless, it is clear that the resources that can be used to implement a biodiverse community model by household depend on household SES (Kinzig et al 2005). Inequality in intra-city biodiversity is a case of environmental injustice, as poor neighborhoods are not only poor economically, but also environmentally (Kinzig et al 2005).

Wu (2008) points out another significant bias in discussions of urban ecology:

'[E]cologists know more about the habitat of penguins in the Antarctic than the ecology of cities in which they reside; they know more about the ozone hole in the stratosphere than the urban heat island in their neighborhoods. Most existing ecological studies in urban areas have focused primarily on the negative impacts of human activities on biodiversity and ecosystem processes. There even seems to have been a perception that ecologists are professionally at odds with developers, architects, engineers, and the like because almost everything that humans do to nature was traditionally viewed as ecologically negative' (Wu 2008: 46).

2) Threats to Urban Biodiversity

The most evident impact of urban development over biodiversity is in change in land use and land covers (Puppim de Oliveira et al 2010). Some cities are strict about zoning to protect natural and agricultural lands while others are not. Two main threats are visible to the security of the green lands: Unplanned settlements and informal housing (Puppim de Oliveira et al 2010), and real estate speculators (including government officials in many cases). In addition, Puppim de Oliveira et al. (2010) mention formal housing which affect biodiversity as in the case of urban sprawl i.e. authorized suburban development which is common in high-income countries.

On the negative side, Puppim de Oliveira et al. (2010) list 9 “obstacles to improve the governance of the CBD”:

1. Cities are not in the core discussions of CBD
2. CBD implementation by national governments is limited
3. CBD is still not mainstreamed in the cities’ agenda
4. Conceptual clarifications are needed to move the biodiversity agenda
5. Citizens lack awareness of the importance of biodiversity and ecosystem services
6. There is a lack of proper instruments to deal with biodiversity at the city level
7. Lack of coordination among different levels of government and among local governments for joint action
8. Differences in the challenges among cities
9. Political resistance for change at various levels’ (Puppim de Oliveira et al 2010: 39-43).

As stated above, the main driver of biodiversity loss is land use change by urbanization and by agriculture due to increasing urban demand for food (Müller & Werner 2010). Secondly, urbanization leads to biotic homogenization which means that a small number of non-native species of plants is planted in urban areas at the expense of native vegetation (Müller & Werner 2010). There are cases where biotic homogenization is observed for animal species as well (Müller & Werner 2010). In this context, Braimoh et al. (2010) mention 5 drivers of biodiversity loss: “Land use change, climate (change), nitrogen deposition, biotic exchange, and atmospheric carbon dioxide” (p.16). Furthermore, Braimoh et al. (2010) develop a comprehensive model for biodiversity loss in Southeast Asia which covers underlying drivers (human population growth, poverty, urban expansion, policy failures, institutional failures, trade and globalization, climate change and other natural factors), proximate factors (agricultural expansion, biofuel production, wood extraction, infrastructure development, and biomass burning), and processes of biodiversity decline (habitat conversion, habitat degradation, habitat fragmentation, species introduction, and overexploitation) (p.18). As to agricultural expansion, Asian export-oriented economic models which are based on agricultural products put pressure on exurban green areas; fertilizer runoff is detrimental to biodiversity; unregulated forest use and access work against biodiversity, and finally, agricultural activities emit greenhouse gases which ultimately affect biodiversity negatively due to climate change (Braimoh et al 2010). Additionally, the trade of agricultural products leads to biodiversity loss by monoculture plantations and resource overexploitation. Trade of endangered species is another additional specific driver of biodiversity loss as in the case of some of the wild animals such as elephants, tigers, bears, reptiles etc. Secondly, regardless of the fact that whether biofuel production is environmentally-friendly is under discussion, it is clear that biofuel production is one of the factors that has precipitated agricultural conversion of natural vegetation. Biofuel production is also a contributor to pollution, climate change

and fertilizer runoff. As biofuel plantations are less friendly to biodiversity compared to forests, biofuel production is considered to be a driver of biodiversity loss (Braumoh et al 2010).

Likewise, Australian Research Centre for Urban Ecology (2009) lists the following threats for ‘sites with biodiversity values’ in metropolitan Melbourne:

- High levels of internal fragmentation
- High risk of site loss due to proximity to major road
- High risk of urban effects (e.g. heat island, pollution)
- High risk of human impacts (e.g. trampling, rubbish)
- Impact by proposed roads
- High risk from introduced plant species
- Likely risk of predation by dogs, cats and red foxes
- High risk from edge effects’ (Australian Research Centre for Urban Ecology 2009:

20).

3) Ethical Dilemmas Involving Urban Biodiversity

Puppim de Oliveira et al. (2010) state that ‘biodiversity is increasingly considered to have an intrinsic value. As a result, more voices are currently articulating that biodiversity should be conserved irrespective of its contribution to human well-being (i.e. irrespective of the ecosystem services it provides)’ (Puppim de Oliveira et al 2010: 18). This corresponds to one of the key issues in urban biodiversity ethics: Conserving biodiversity for its services vs. caring for the nature as a responsibility flowing from higher ethical values transcending immediate needs of Homo sapiens. At a more specific point of view, Dunnett et al. (2007) pose another central dilemma which resembles Puppim de Oliveira et al. (2010)’s third question mentioned above (“which biodiversity to preserve?”): ‘When considering biodiversity in gardens, is the central concern the range of different fauna and flora, the rarity of the species sighted, or simply the abundance of wildlife? Is it just as valid to have a large number of common species, as it is to have one rare species?’ (Dunnett et al 2007: 8). Third dilemma is about vegetarianism. Vegetarianism is more eco-friendly. Thus, a main ethical dilemma for urbanites is whether to go veggie or not. The fourth ethical dilemma is based on the conflict between aesthetic vs. ecological choices in urban vegetation. Most of the time, urban flora is planted to look good rather than its ecosystem services (Dunnett et al 2007). This mode of choice determines the prevalence of attractive plant species which may crowd out better ecosystem servers.

Fifth ethical dilemma for urbanites which is quite enormous is the purchase and consumption of ecologically certified products such as Fair Trade products, organic products etc which are directly relevant for biodiversity conservation, and the promotion of sustainable consumption and production practices. These practices involve biodiversity certification, green consumerism, ecolabels, green product life cycles, green supply chains, accountable and responsible consumption and production, green accounting and a whole bunch of new approaches. Each of these can be discussed in separate papers. Unfortunately, movements to protect biodiversity are not as strong as green consumerism movements in cities (Petersen et al 2007). ‘Biodiversity’ has not been elevated to the status of a common everyday word yet; it is still considered to be jargon, a technical term or sophisticated philosophy (Dunnett et al 2007).

The ethical dilemmas facing urbanites are not only at the primary theoretical level. There are also meta-ethical dilemmas that need solutions or guidelines: Firstly, should we have a separate ethics for urbanites vs. urban planning professionals? Connected to this is the meta-ethical dilemma which involves a uniform single ethics code vs. specific multiple ethics codes. Thirdly, given that biodiversity is mostly luxury for low SES urbanites, should we have separate ethics based on different levels of SES? Fourthly, should we have separate urban biodiversity ethics for adults and kids? Before all, should underageds be a part of the ethical discussion? (Of course, this question is explored in different sub-branches of ethics on various occasions.) Fifthly, given that urban biodiversity is linked to regional and global biodiversity, what should be the scope of urban biodiversity ethics? Urban? Exurban? Periurban? Global? Sixthly, is biodiversity more important than other values? Is a hierarchy of ecological values possible and necessary for an ethical framework? Seventhly, the relationship between laws, rules, policies and ethics relevant to urban biodiversity should be investigated and clarified. This topic needs to be discussed in another paper. Actually, the list of 5 ethical dilemmas and 7 meta-ethical dilemmas presented here can be extended; but even the total of 12 dilemmas can't even be discussed here, as they need separate treatment in a pure ethics paper.

Animistic natives attribute animacy/spirit to nature and consider her as a service provider whose services are borrowed, and not totally tamed and owned. However, modernist view of nature is that of enslaving nature, and putting priority of human needs over the renewability needs of ecosystems (Groenfeldt 2010). The needs of nature and people should be balanced (Groenfeldt 2010) keeping in mind that people not only have economic needs, but also environmental and social needs (eg green spaces, enjoyable leisure time etc).

4) Recommendations

Dunnett et al. (2007) list the following as 'barriers to realising opportunities' for 'the role of horticulture in supporting biodiversity' in urban areas: 'a lack of understanding; public opinion; corporate culture ('organisational inertia'); cost, operation of the market and possible consumer resistance; policy issues (local and central government policies); and shortage of skills in the horticultural sector' (Dunnett et al 2007: 33-37). Formal and nonformal forms of education/training are necessary for urban biodiversity conservation (Dunnett et al 2007). This is especially relevant for rapidly ageing populations such as Japan and Europe. Biodiversity training can be viewed as part of more inclusive and elderly-friendly urban planning. Biodiversity and ethics training for elderly and children can go together. Combined on-site training programs for grandparents and grandchildren can be especially useful. This would provide an opportunity to enjoy quality time together with 3 generations of family, out of choking shopping malls and gaming centers.

Puppim de Oliveira et al. (2010) list the following as 'instruments for improving the contribution of cities to the CBD (Convention on Biological Diversity)':

1. Development and implementation of proper housing and infrastructure policies
2. Provision of a good network of urban green spaces and functional aquatic habitats
3. Local sustainable production methods for biodiversity in urban areas
4. Improvements in public transportation and more compact cities
5. Increasing awareness among urban dwellers and decision-makers
6. Stronger links with national and international networks' (Puppim de Oliveira et al 2010: 27-38).

Furthermore, Puppim de Oliveira et al. (2010) list 6 ‘opportunities to move the CBD agenda forward’ in line with Kraas (2007) and Wu (2008):

1. Cities as an efficient body to protect biodiversity
2. Cities’ involvement to tackle global problems and development of new instruments
3. Urban dwellers tend to be more educated and environmentally sensitive
4. Policies can be more effective at the city level because of the scale
5. Opportunities for win-win situations between biodiversity conservation and other benefits
6. Convergence of the movements on biological diversity and urban planning’ (Puppim de Oliveira et al 2010: 43-47).

One way to conserve biodiversity is the protection and promotion of native species (Hostetler & Main 2010a). One way in that direction is promoting native flora that feed native fauna (Hostetler & Main 2010a). Turf-grass lawns and non-native ornamentals are detrimental to urban biodiversity, as they are artificial, and they don’t provide a feeding ground for native species (Hostetler & Main 2010a). Part of this effort is of course taking measures against invasive species (Hostetler & Main 2010a). Pets can affect local species; thus, pet management should be considered for biodiversity conservation (Hostetler & Main 2010a).

Although supporting native flora and fauna is recommended by experts (this is what we can call as ‘nativism’ or ‘natural conservatism’ in the age of economic, social and ecological globalization), Miller (2008) challenges this nativism bias, as human activity has already changed the habitat. In some cases, the urban habitat has changed so rapidly that native species could not survive; in those cases, exotic species are introduced for a greener habitat (Miller 2008). There may also be some beneficial outcomes of introduction of exotic species in some cases (Miller 2008). Furthermore, a careful introduction of exotic species would add to the urban biodiversity (Miller, 2008). Finally and more significantly, most of the vegetables are non-natives anyway (Dunnett et al 2007; Gezgin 2009). On the other hand, precautionary principle should be applied for endemic species (not natives, but endemics) which exclusively inhabit that particular urban habitat.

Models and designs that promote win-win scenarios are necessary where both humans and biodiversity are well-off (Miller 2008). One of these is green roof and/or rooftop garden approach (Mazereeuw 2005; Miller 2008) while the other is living wall models (Loh 2008), in other words vertical gardens (Tarran 2009). Both are conducive to urban biodiversity conservation. To support urban biodiversity, incorporation of biodiverse models into EIAs (Environmental Impact Assessment) is not enough; a long term perspective at program or policy level such as SEA (Strategic Environmental Assessment) is sine qua non (Countyside Council for Wales 2007).

Promotion of urban biodiversity leads to green and blue spaces which attract professionals and companies which is positive for economic development of the city (Petersen et al 2007). Biodiversity also increases the value of real estate in urban areas (Petersen et al 2007). Many of the urbanites value urban vegetation due to aesthetic and visual reasons, but they are not knowledgeable enough about the ecological functions such as “human comfort, energy budgets for buildings, mitigation of urban heat islands, air quality improvements, carbon dioxide uptake and stormwater and catchment benefits” (Tarran 2009, p.1). Urbanites benefit from urban vegetation not only ecologically but also psychologically and socially, although in many cases they are not aware of that. Tarran (2009) and Mazereeuw (2005) provide an overview of research on psychological and social benefits of urban vegetation. Thus, the

urbanites should not only be informed about the ecological services of urban biodiversity, but also psychological and social services. On the other hand, from an economic point of view, one should take into account that urban vegetation is mostly a public good which is and will be undersupplied by market mechanisms. Government involvement is critical, along with the promotion of greening of industries. Local government should take the initiative to promote intensive and extensive green roofs by subsidies and other forms of incentives. This has been the main factor behind the success of the growing trend towards green roofs in Belgium (Claus & Rousseau 2010). Green roofs provide a green network to foster urban biodiversity.

The focus on ‘urban forest’ rather than individual trees in the city is relatively new. ‘Individual tree’ approach does not consider each tree in the city as part of a green infrastructure and network; while ‘urban forest’ approach has a holistic focus. The interest in forests out of the city accordingly translates slowly to the less concentrated ‘forests’ in the city (Tarran 2009). As forests out of the city are more concentrated and visible, they are more protected compared to urban forests. A slow but hopeful conceptual shift is observed at this point. For example, Berlin protects urban trees by the legal status of ‘natural monument’ (Senate Department of Urban Planning 2003). Secondly, tree planting activities out of the cities are more frequent than those in the cities. Thirdly, trees are more visible and more valued compared to other forms of urban vegetation; however, the latter is also part of the green infrastructure. All vegetation types are nurturing urban biodiversity. On the other hand, it should be kept in mind that the existence of green areas does not guarantee biodiversity. In some cases, brownfields (abandoned industrial sites) are more biodiverse (Petersen et al 2007). Thus the assumption that greening of the city automatically boosts biodiversity should be avoided. It depends on vegetation type and many other factors. Furthermore, Dunnett et al. (2007) point out that urban green areas especially parks are still considered to be primarily recreation sites as a legacy of the Victorian dirty industrial city model, and thus they are still under recreational management authorities in many cities. Thus a focus on ecosystem services provided by urban green areas needs a reshuffling of municipal structures.

There are 4 general drivers for urbanites to build urban biodiverse communities:

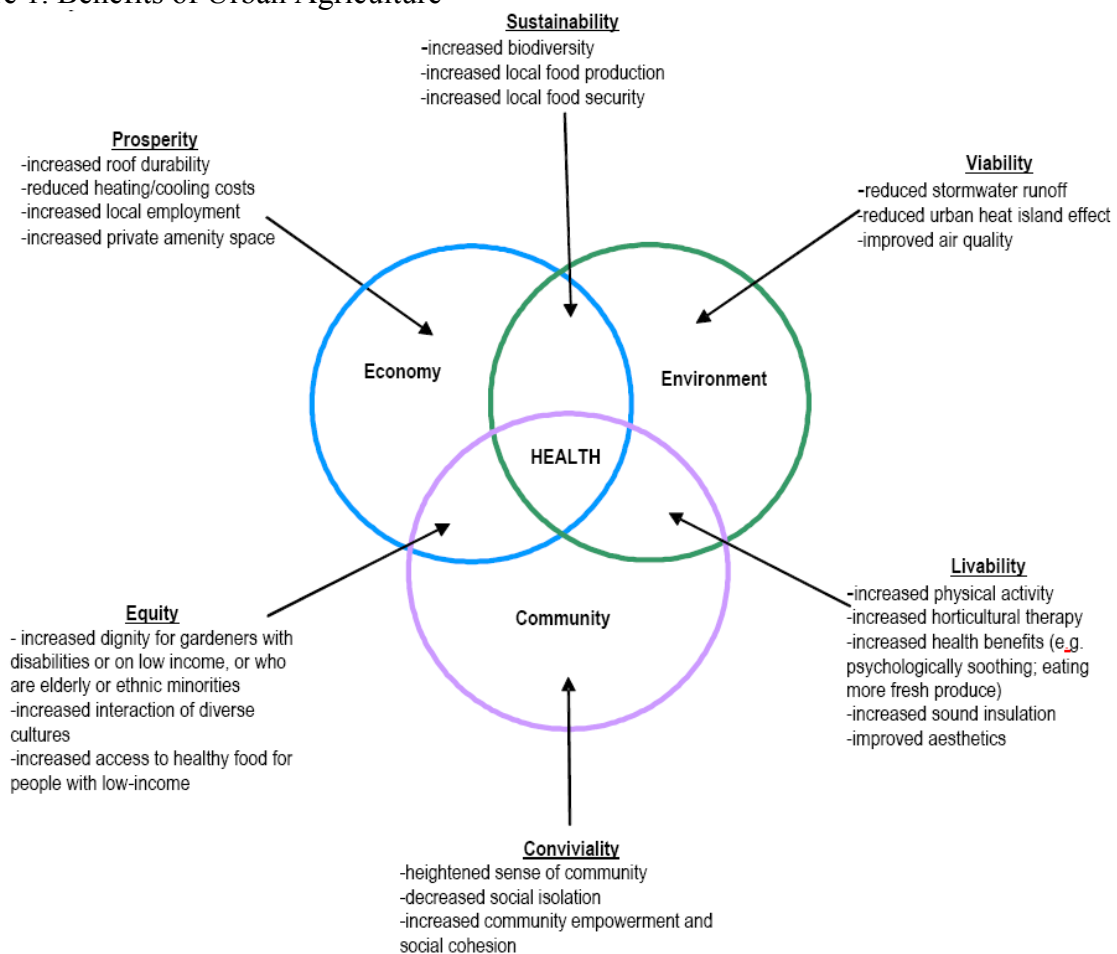
- 1) Top-down: This is by the enforcement of local or central governments (Kinzig et al 2005).
- 2) Bottom-up: This is by the grassroots movement of residents as an individual unit or as in the case of neighborhood, district and city associations. Neighborhood relations, peers and kinship are critical in planting decisions along with natural constraints (Marco et al 2010).
- 3) Lateral: In this case, cities impressed by good examples of other cities copy those practices.
- 4) Internal: In this case, a member of a household or an employee of government, company or organization takes initiative as a green intrapreneur or sustainability champion.

Petersen et al. (2007) report the example of Zagreb, Croatia in which urban biodiversity information was publicly accessible, and local people were encouraged to take the initiative to protect and monitor the biodiversity. These examples can be especially addressed to children, as monitoring of butterflies, birds etc is like a game for them. Public participation and a broader understanding of stakeholder involvement in urban planning are vital for the protection of biodiversity (Dunnett et al 2007; Petersen et al 2007). Utilization of local ecological knowledge provided by local residents is necessary to build a more realistic model of urban biodiversity (Petersen et al 2007).

Mazereeuw (2005) discusses the current state of urban agriculture in Waterloo (Canada) which is categorized into community gardens, green roof and rooftop gardens, and private

gardens (backyards). Although green spaces are under stress by rapid urbanization and expansion of construction areas, Mazereeuw (2005) recommends promotion of urban agriculture as a solution to many problems of urban life. Unfortunately, it is quite unrealistic to promote urban agriculture in cities where real estate speculators attack even public parks; but Mazereeuw (2005)'s list of benefits is comprehensive enough to lobby for at local and central government levels. Furthermore, Mazereeuw (2005)'s recommendations are mainly focusing on green roofs and rooftop gardens which are relatively easier to promote than urban community gardens. Figure 1 summarizes Mazereeuw (2005)'s conceptualization of urban agriculture:

Figure 1. Benefits of Urban Agriculture



Source: Mazereeuw 2005: 2.

We close this section by concise and insightful remarks of Berkessy and Gordon (2010):

‘Effective conservation of biodiversity will require changes to current approaches to land use, pollution control, resource consumption, waste and recycling, valuation of natural resources and the role of the community and individuals in protecting the environment. Good government policy is fundamental to implementing the changes needed. However, history has shown that policies relating to biodiversity conservation are not commonly matched by effective policy implementation and good biodiversity outcomes. Ecologically sustainable development in urban areas will not be possible unless many more financial and human resources are directed to support improved understanding and management’ (Berkessy & Gordon 2010:6).

5) Conclusion

5.1) The author of this paper has no option to initiate urban agriculture in his rented apartment flat, and millions are imprisoned in ungreen architectural structures like him. Thus, we need to be realistic, although that doesn't mean that we should be pessimistic.

5.2) The 'alien' (Klingon) in 'Star Trek VI' (1991) is right: 'Human rights is racist'. But to notice the racism of 'human' rights, we don't need to wait for the arrival of 'barbarians' 'a la Kavafis' or of Klingons 'a la Star Trek'. We are only one of the species of the enormous biodiverse community called 'nature'.

5.3) In Star Trek IV (1986), the extinction of humpback whales equals the extinction of Homo sapiens. This story is related to urban biodiversity for two reasons: Firstly, the whales were kept in captivity in San Francisco due to the urban demand for recreation and fear of human hunters; secondly, the whales are hunted due to increasing urban demand for food and other related products. We can't wait for the end of the world to realize the truth in this holistic equation of extinction.

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