Environmental impacts and economic implications of Urban Agriculture

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General information about the module

Module n° 4

Environmental impacts and economic implications of Urban Agriculture

Authors: Ignacio Cazcarro and Irene Pérez Ibarra

Introduction

This module follows up from Module 3 on ecosystem services approach, complementing the views with other perspectives and indicators, and tries to link it more to the economics and public policies. It introduces methodologies available to assess environmental sustainability and economic implications of urban agriculture.

The theoretical broad frameworks on socioeconomic and environmental indicators are complemented with the economic implications and public policies, where we distinguish between the micro and meso-macro scales of analysis of urban farming.

Duration:

8 hours – The duration of this module is four hours of the lesson and four hours the practice of the exercises together with additional resources.

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Learning Outcomes

On successful completion of Learning Unit 4 participants should be able to…

Knowledge	Technical skills	Soft skills
• Understand the frameworks and concepts related to the environment and economics. • Know the different types of costs and benefits that can be associated to urban farming • Learn their relation to public policies and public instruments (subsidies/taxes…)	Be able to establish/estimate what are going to be the individual costs and benefits over the years, in order to start assessing the economic sustainability of the (own) activity of urban farming.	• Be able to identify in the field important elements of urban farming, i.e. inputs or factors of production (e.g. water, machinery) are or can be shared among farmers around the area. • Communicate the social and environmental benefits of urban agriculture, relating it to public policies.

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Main content and resources

CHAPTER 1. Environmental sustainability assessment

1.1. Indicators and indices, product-related assessment tools and integrated assessment

There are several types of frameworks, analytical tools and metrics that have been developed to assess the achievement of sustainability globally (**Ness et al., 2007**), categorized in three major areas – **(a) indicators and indices**, (**b) product-related assessment tools**, and **(c) integrated assessment** (**Figure 1**):

(a) Indicators are simple measures which then can be aggregated to an index. As shown in **Srinivasan et al.** (**2011**), examples include Ecological Footprint Analysis (EFA), Wellbeing Index (WI), Environmental Sustainability Index (ESI), Human Development Index (HDI), etc.

(b) The product-related assessment tools focus on production and consumption of goods and services. Examples include Life Cycle Analysis (LCA), Life Cycle Costing (LCC), product material flow analysis, etc.

(c) Integrated assessment tools are used for supporting decisions related to a project or a policy. Examples include the Cost Benefit Analysis (CBA) approach described referred also below.

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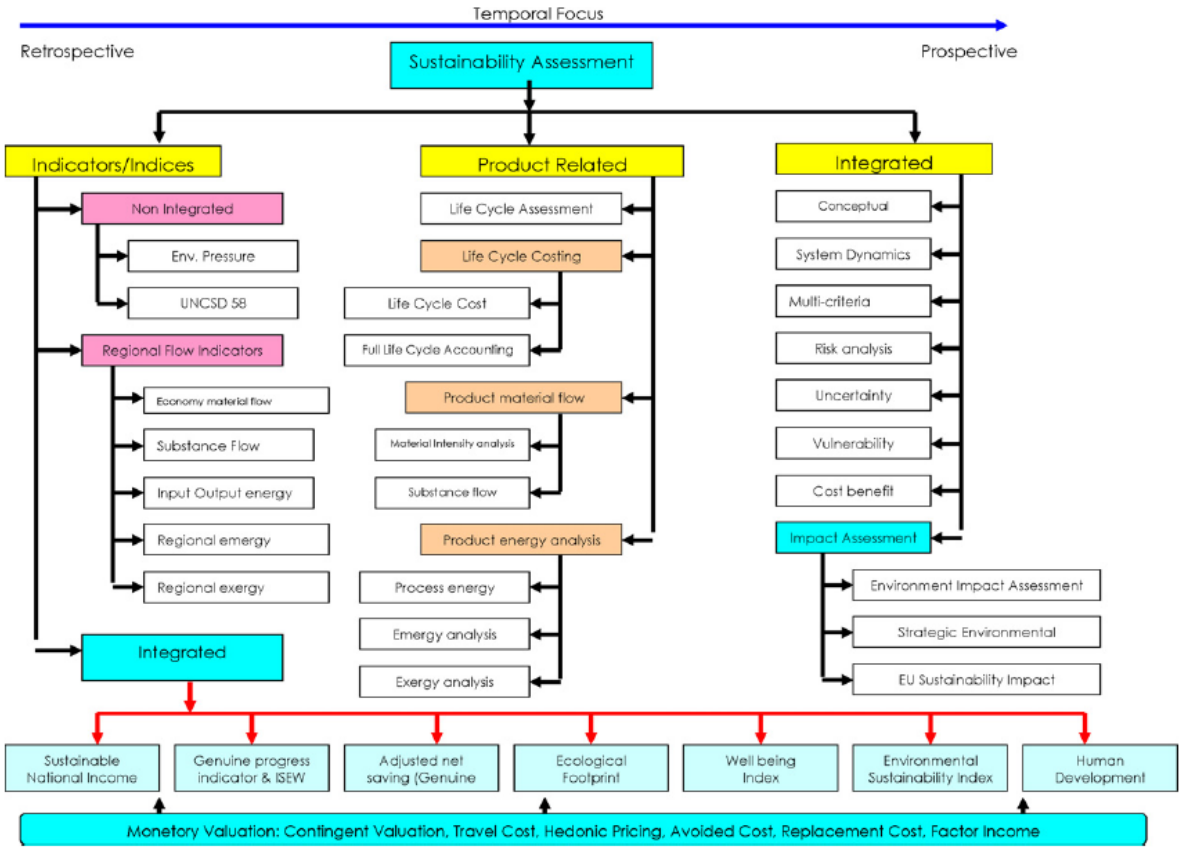

*Figure 1. List of sustainability assessment. (source: Figure redesigned in **Singh et al., 2009** based on the original work of **Ness et al., 2007**).*

1.2. Sustainability in relation to economic viability and profitability

FAO (**2007**) identified commonly addressed sustainability criteria among frameworks, which included productivity, land security, protection of environment and people, economic viability, social and political acceptability, and ability to form cooperatives.

It was proposed that the "sustainability of [urban agriculture] basically implies its ability to continue in the future and operate at the current or increased levels. In order to be sustainable, [urban agriculture] should be profitable and economically viable, environmentally sound, socially just and culturally acceptable".

Those type of general indicators and parameters for sustainability assessment have been made more specific for urban farming. For example in **Farming Concrete** (**2015**) we may find: food production (crop and harvest count), environmental data (landfill waste diversion, compost production, rainwater harvesting), social data (participation, skills and knowledge creation, outreach), health data (attitude change, emotions, healthy eating, aesthetics of the garden), and economic data (market sales, donations of food). **Feola et al.** (**2020**)

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highlights sustainability dimensions in selected studies and methods for sustainability assessment of urban agriculture.

The analysis of the interaction of nature and socioeconomics has different views and paradigms. In **Module 3** we have followed the ecosystem services conceptualization, which we consider very useful to understand what urban farming may provide. These relate very directly with a research line in economics of ecosystems services valuation. In any case in economics there is not at all a unique way of measure and value nature and its interaction with humans. Indeed, we can talk at least about two broad tendencies:

1- **environmental economics**, which usually follows more of traditional orthodox concepts and toolboxes. It tends to see environmental benefits and ecosystem degradation as "externalities" (a cost or benefit incurred or received by a third party, who did not create it) of the activity of a person, firm, state, etc.

2- **ecological economics**, which is more an interdisciplinary field addressing the interdependence and coevolution of human economies and natural ecosystems, both intertemporally and spatially, promoting human well-being, sustainability, and justice. In this case the economy is seen as a subsystem of Earth's larger ecosystem.

Despite the often less tractable and more complex methods for valuation of this second view, in general then it tends to be more comprehensive and holistic, which is closer to the ecosystems services approach of **Module 3** and fits better with what urban agriculture entails. As borderlands, peri-urban spaces are socially diverse, economically multifunctional, and ecologically complex. For this reason, here to value the “economic impacts” (positive and negative) we not only focus on some basic monetary measurements, but also from more holistic analyses.

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Figure 2. Main cost and benefits provided by Urban Agriculture (Author; Ignacio Cazcarro, Project INNOFARMING)

CHAPTER 2. Economic implications and public policies

2.1. Micro-meso scale economics at the gardens/farms

The subsection connects with **"Module 2: Technical aspects of Urban Agriculture"** and with what will be completed in the section **"5.4. Economic, management and financial aspects of Urban Agriculture"**

Departing from a common basic method in environmental economics, cost-benefit analysis (CBA) is an initial way of assessing the activity, or even just with pure business accounting of it one would register.

Usual private costs: At a farm/garden level, typically the inputs and costs that the farmer needs to consider are conceptually very similar to farming at any other place, just with a few particularities. This means that one needs to account for the fixed and/or startup costs, cost of land, and crop-specific costs, which includes the seeds, the rest of the inputs or

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factors (being the first those consumed regularly and the second those durable) needed for production (tools, machinery, etc.), services (marketing and administration) and the so called factors of production (the first 2 also often considered as inputs): energy, water, land, labor and capital.

Labor costs are generally the largest cost category for urban farms, since it is often non-mechanized. It also found that most of the owners (e.g., of Vancouver's urban farms) do not pay themselves an hourly rate or account for their own labor and management costs in their business expenses. Rather, they pay themselves from revenues after all other business expenses have been paid. According to **Dorward et al.** (**2013**) best practice is to include "return to management" in planning budgets so that the urban farmer can anticipate a reasonable income from the farming business.

In a study with a small sample in Philadelphia (**Hunold et al., 2017**) the biggest farmer identified challenges in Urban Farming were money (capital cost of farming) and time. The main agricultural capital costs according to interviewees were those shown below.

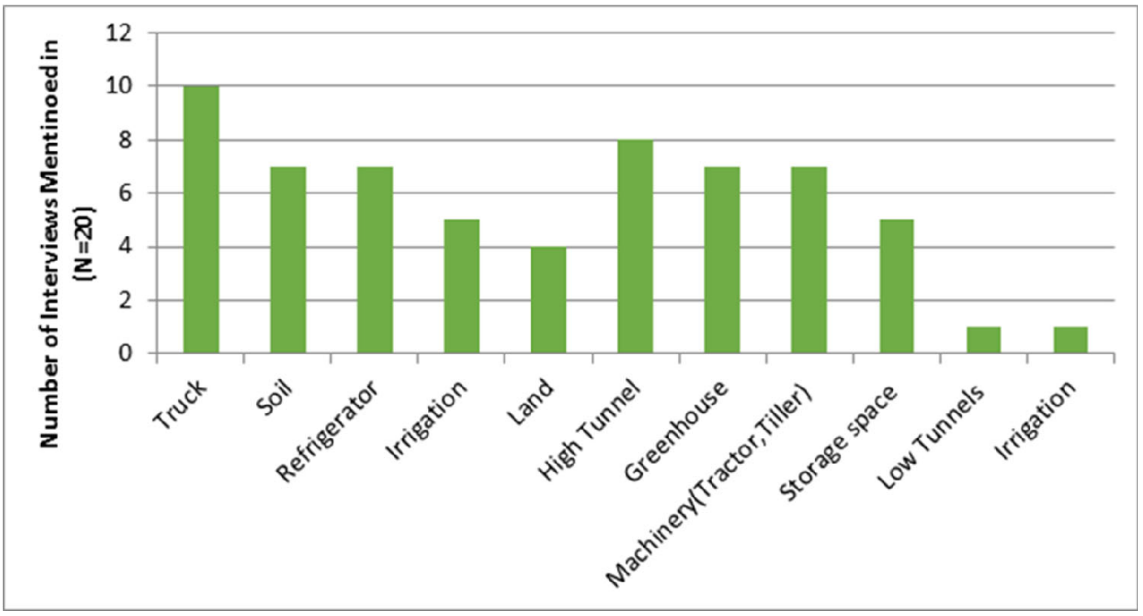

*Figure 3. Main agricultural capital costs (**Hunold et al., 2017**).*

In our interviews with experienced urban farmers from the region of Aragon (Spain) we reframed this idea, with the understanding that time seems always scarce for farmers, and ultimately it is an opportunity cost (if you need time to commute, to buy something, to obtain or manage inputs/factors, distribution/commercialization of the product, etc., you have less for other activities). In that sense for example bureaucracy (specially to commit to some regulations or certifications, e.g. of ecological agriculture) can be an important "cost" as well. Also, an important insight is that some production factors, especially machinery and tractor/crawler/agrimotor, can be shared with other nearby farmers, or be rented/bought 2nd hand, until one is certainly sure of the actual need (to then consider if the initial investment is really needed). The example in the box below of the individual

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simplified cost-benefit analysis clearly illustrates how costs and hence net losses can be expected with initial high investments.

Another **differential reduction of costs** that urban farming can incorporate with low costs of transport is reusing composted urban organic waste. So environmental data to examine is landfill waste diversion, compost production, and also rainwater harvesting, which might be also a differential diminution of cost in urban gardens.

Usual private income: Typically, most accounting (of any economic activity) would be focus on income, that is to say, in the production model (the figures on harvest), the transformation and commercialization (hence in the ability to sell –if that is the case a certain volume to a certain price, etc.). The first connects with what has been seen in **Module 1** at the section **"1.3. Production system typologies in urban environment"**.

Net benefit: The standard business accounting (SBA) way to measure is the difference among private/individual income and costs, obtaining a profit (if positive) or loss (if negative). In SBA: Gross benefits = sales revenue - cost of sales
Net benefits = Gross benefits - taxes - interest - depreciation - general expenditures
However, in the box below on "Individual simplified cost-benefit analysis example" we also present what can be more of a type of "household" accounting in which we obtain a Net "pragmatic" (that we call P, even if it is not a usual term in economics) Benefit oversimplifying the above. Since we omit for simplicity the existence of payments of interests on lending/borrowing or any loss of value of money over time, this allows us to also see the overall global income and expenses in which an urban farmer gets into at the time they occur (without deferring payments or having imputations of them along the year). Then the general intuitions do not change much here among these ways of accounting.

Profitability is often defined as the degree to which a business or activity yields profit or financial gain. Some gross measure of profitability on revenue is the ratio of net income to sales: Return on Sales = Net Benefit / Sales.
Another usual measure is relative to assets: Return on Assets = Net Benefit / Assets.

Obviously behind these general economic concepts there are many aspects that one needs to consider. For example, **CornellCALS** (**2020**) devote key sections to making urban farming possible (e.g., on the importance of codes and regulations, or pointing out that the lack of accessible land can be one of the greatest constraints to urban farming), but also others to make it profitable. In particular there are recommendations on the following aspects: Business Planning, Business Structures, Risk Management and Insurance, Assessing Market Potential, Pricing Farm Products, Finding Price Information, Direct Marketing Options and Regulations, Marketing in Urban Environments (e.g., the existence of market niches, such as producing crops that do not transport well, taking

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advantage of warmer urban micro-climates to produce crops earlier or later than the average season, cultivating specialty crops in demand by local ethnic populations and markets, etc.), Community supported agriculture, Food Security and Access, Value-Added Processing, Record Keeping (at a minimum it is needed a record keeping system for tax and legal compliance), Labor Information, Grant and Financial Opportunities and Financing an Urban Farm (e.g., identifying that the ideal source of money for a new farm enterprise is the farmers own cash).

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1st year

Costs: Setting-up/establishing the activity/company = 600 euro
Investment costs (land; and tractors/machinery for ~15 years□) = 5000 + 15000 euro
For standard business accounting, the yearly deprecion □ is:
15000/15=1000euro
Regular costs (of inputs) = seeds + other inputs+ (fertilizers) = 200 euro
Labour (2 people): 10 euro/hour * 160 hour * 2 = 3200 euro
Distribution/commercialization activites = 300 euro
Benefits: Vegetables & fruits produced by a household per month:
Output (Sales): 1 euro/kg * 2000 kg = 2000 euro
Subsidy (e.g. young farmer) = 200 euro
Gross Benefits in standard business accounting: 2200 – 3700 euro = – 1500 euro
Net Benefits in standard business accounting (no taxes paid): 2200 – 5300 = –3100 euro
Net "pragmatic" Benefits (no taxes paid): Benefits – Costs = 2200 – 24300 = – 22100 euro

2nd year:

Costs: Regular costs (of inputs) = seeds + other inputs + (fertilizers) = 250 euro
Labour (2 people): 10 euro/hour * 160 hour * 2 = 3200 euro
Distribution/commercialization = 300 euro
Benefits: Output (Sales): 1 euro/kg * 3000 kg = 3000 euro
Subsidy (e.g. young farmer) = 200 euro
Net "pragmatic" Benefits (no taxes paid): Benefits – Costs = 3200 – 3750 = –550 euro
"Pragmatic" Return on Sales = Net "pragmatic" Benefit / Sales = – 550 /3000 = –18.3%
Net Benefits in standard business accounting (no taxes paid): 3200 – 4750 = –1550 euro

3rd to 5th years (each year):

Costs: Regular costs (of inputs) = seeds + other inputs + (fertilizers) = 300 euro
Labour (2 people): 10 euro/hour * 160 hour * 2 = 3200 euro
Benefits: Output (Sales): 1 euro/kg * 4500 kg = 4,500 euro
Net "pragmatic" Benefits before taxes: Benefits – Costs = 4500 – 3500 = 1000 euro per year
Net "pragmatic" benefits after taxes (assumed 15%) = 850 euro per year
"Pragmatic" Return on Sales = Net "pragmatic" Benefit / Sales = 850 / 4500 = 18.8%

□ It is assumed as assets are the land acquired (5,000 euro), whose value do not depreciate (there is not an expensing or loss of value of the asset); and the durables (tractors/machinery) with a useful life of 15 years. Depreciation for accounting purposes refers the allocation of the cost of assets to periods in which the assets are used. It is also assumed that the year with losses

Individual simplified cost-benefit analysis example

Figure 4. Individual simplified cost-benefit analysis example (own elaboration based on ***Buckley and Peterson****, 2012).*

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In our interviews with experienced urban farmers from the region of Aragon (Spain), we found many farmers who performed this activity as a complement to other sources of income, or as hobby/leisure, and they were not very much concerned about the net benefits (they assumed some economic losses in several cases). For those who do it for profit, or at least as main activity for subsistence (even when they may have additional motivations for doing so, related to the importance of eating healthy, local food, or organic, etc.) we also learned about their difficulties for distribution and selling, especially in the first years of activity. In that regard, the importance of being able to cope with the initial investment costs (without much interest to repay if getting a loan, which obviously play a role in the real world), production and selling issues in the first years seem key challenges.

Also, interviewing urban farmers about COVID19 times in Spain, we were told in general that they had some initial temporal restrictions to go and work in the farm. However, interestingly for-profit urban farmers found that buyers had more interest in their food (seen as local, healthy, especially if “organically” produce, etc.) and actually increased the sales. This reveals that often the context, in the same fashion than climate (or even natural changes, disasters) may have some unexpected influences in the income, costs or/and profits. In any case, the **USDA** (**2016**) toolkit linked at the end of the module emphasizes the need of a “business plan” in urban farming, to be aware of most of these issues, and having reasonable plans and estimates in advance.
Obviously, the narrow monetary valuation above does not include many other potential benefits and costs, especially those that tend to occur to somebody else than the farmer/s. A business-oriented advocacy literature sees urban agriculture as a way to generate income for farmers; however, broader research on the economic sustainability of urban agriculture tends to stress as benefits a combination of revenue and less quantifiable “externalities” (in the conception of environmental economics) or “services” (e.g., the ecosystem services seen in **Module 3**).

Taking just the first perspective (pure business orientation), it should be considered that pure economic profitability may in some experiences -as with any other business- result in low monetary outcomes (even losses). Some studies based on interviews have found a variety of results on profitability (some with wins, some with losses, some break-even), appearing the losses especially when labor costs (sometimes these are not accounted for if it is seen as a hobby for the farmer, or some family members contribute partially with their time, etc.) were accounted for.

Also, it should be noted that while for-profit farms seek to generate a financial profit for their owners, non-profit farms aim to benefit the greater good of the community. This difference is reflected in their tax status: e.g., in the example of the US a for-profit farm is taxed on its profits while a non-profit farm is not.

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Notwithstanding, in addition to revenue from crop sales, many for-profit urban farmers derive revenue by providing other unique services to their communities. As interestingly highlighted in **Dorward et al**. (**2013**), some urban farmers offer workshops on topics such as garden planning, soil management, and seed saving. Some host summer camps that teach agriculture to children and connect them to the food system through the urban farm and a host of farm-related activities. Urban farmers also act as "edible landscaping" consultants, working with homeowners to design and build backyard "foodscapes". The success of urban farm workshops, community programs, and consulting is directly linked to urbanites' increasing concern about food security and interest in local foods. Many citizens want to gain tangible skills to address these issues, and are willing to pay urban farmers to share their expertise.

2.2. Meso-macro scale of economic implications of urban farming

As hinted when discussing profitability, in economics we may see that the desirable social benefits and costs are different from the aggregation of all private/Individual views and decisions, based on the own local measurement of income and costs. The fact that, as we have seen especially in **Module 3**, there are many services (and on the contrary in some cases, impacts) which urban farming provides (generates), but that are not considered in the individual benefits (costs). For this reason, there are methods (some of those summarized in 4.1.1, and also CBA should consider social costs incurred and social benefits obtained, i.e., by all members of society) and arguments to include these from an aggregate perspective, either of a more or less self-organized community or from a local/regional government. For urban farming then is important to know and communicate the wider (socio/environmental) economic value of urban agriculture to policymakers, funders, and other decision makers.

The most common economic way in which these aspects (e.g.. other social benefits/losses) are considered and accommodated is through public policies, i.e., with intervention of local or regional governments, which take the role of incentivising or discouraging certain undesirable practices through policies, regulations, subsidies/taxes, etc. Taking some wider perspective accounting all the economic and physical flows in a city or region, e.g., with the perspectives of life cycle assessment (LCA) or input-output analysis (IOA), policy makers and consumers may decide considering (although in general not fully do) also (i) supply-chain efficiency (reduced distance from farm to consumer attenuating "food miles" and carbon footprint); (ii) urban symbiosis (interactions with a city's material and energy fluxes, reduction of a farm's operational inputs, absorption of urban waste flows such as food waste, lowering building energy demand, and other local environmental benefits such as tempering storm water runoff); (iii) ex-situ environmental benefits (reductions in agricultural land occupation, carbon sequestration) (**Goldstein et**

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al., 2016) or also iv) the value of food consumption and the right to nutritious food, v) participation processes (central in other indicator-based assessment methods, see **Farming_Concrete**, **2015**), etc.

2.3. Public policies, guidelines and best practices

Around urban farming there are also privileged particular discursive framings (e.g., the socially inclusive city, the environmental/sustainable city, economic development) to pursue different policy objectives (**Van Veenhuizen, 2006**). Urban agriculture has attracted the attention of academics, policy makers, and practitioners alike as a potential measure to support the food needs of growing urban populations and contribute to address some of the negative environmental and economic effects of urbanization.
Hence based on the recognition that urban farms contribute more to communities than just food, not only many local governments, but also foundations, and businesses have also made grant funding available to support organizations dedicated to sustainable local food production (**Dorward et al., 2013**). Grants and donations therefore comprise a valuable revenue stream, utilized primarily by urban farming organizations with charitable or non-profit status. In Canada, Vancouver's Sole Food Street Farm, for example, is a highly successful urban farming social enterprise whose mission is to "empower individuals with limited resources by providing jobs, agricultural training, and inclusion in a supportive community of farmers and food lovers" (**Solefood, 2012**) with supported through in-kind and financial donations from a variety of organizations.

Often based on understanding at least some of the above aspects, many institutions have supported urban agriculture in different ways. Considerable advances have been made at the research-policy interface to derive lessons, best practices, and guidelines for the implementation of urban agriculture initiatives (**Van Veenhuizen, 2006**). Guides for urban farming that have been developed, e.g., in Chile or Spain (mostly by regions or city departments), (**Castro Inzulza, 2017**; **Puente Asuero, 2013**), showing the different local legal and technical aspects required. Also, among them, it is common to find best practices recommendations. These often touch on improving resource use efficiency and reducing negative environmental impacts.

A collection of best practices in urban and peri-urban agriculture from many cities, from the Milan Urban Food Policy Pact is claimed to be gathered in **MADRE** (**2014**). **Hendrickson and Porth** (**2012**) highlight the need for local authorities to review of codes and city ordinances that may inhibit the development of urban agriculture, while working on promoting the activity, commercialization and distribution. In **City of Kamloops** (**2007**) best practices are mainly focused on municipal governments and activities associated with policy, among many others, in i) infrastructure: e.g. to consider opportunities to connect

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compost programs to urban agriculture; ii) economic development: e.g. supporting locally-owned stores and sale of local products; link to existing buy- local; iii) coordination with other departments and sectors iv) urban planning: e.g. considering community gardens as a priority use when evaluating uses for city- owned land; v) resource/soil management: support “recycle” farms that incorporate waste products at the dump/landfill and below the sewage treatment plant. Anyhow, best practices are often highly context-specific.

At the farmer level, best practices are typically focused, on the one hand, on improving resource efficiency, following the notion of ‘doing more with less’, which to start with implies ‘never using more of a resource than needed’.

On the other hand, apart from care in the conservation (e.g., soil) and use of resources, there is emphasis on food safety, producing healthy production also keeping (minimizing air, water, and climate pollution) and creating a healthy environment (e.g. with reasonable promotion of biodiversity). On the contrary, urban agriculture, especially when not conducted according to best practices, can contaminate the urban environment (e.g., agrochemical residues or excess nitrate in water courses and water supplies). For this reason, the water pollution (as well as others, such as soil quality) indicators in the city and peri-urban areas are also of relevance to understand the environmental impacts.

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Key Concepts and Vocabulary

Cost-benefit analysis (CBA): From a narrow perspective it may be associated to the mere (private) business accounting, but in general it needs to consider the benefits accruing to and the costs incurred by all members of society – hence the terms social benefits and social costs. Still, valuing non-monetary aspects often need additional frameworks and tools.

Ecological economics: interdisciplinary field addressing the interdependence and coevolution of human economies and natural ecosystems, both intertemporally and spatially, promoting human well-being, sustainability, and justice.

Environmental economics: standard economic concepts and toolboxes applied to the environment, understanding environmental benefits and degradation as an “externality”.

Externality: A concept of environmental economics, meaning a cost or benefit from the activity of a person, business, state, etc., incurred or received by a third party, which did not create it.

Profitability: the degree to which a business or activity yields profit or financial gain (net benefit, which is the difference between income and cost).

Public policies: system of laws, regulatory measures, courses of action, and funding priorities concerning a given topic promulgated by a governmental entity or its representatives. In short, it is what governments chooses to do or not.

Resource efficiency: using the Earth's limited resources in a sustainable manner while minimising impacts on the environment. It allows us to ‘do more (output) with less (inputs).

Sustainability of [urban agriculture] basically implies its ability to continue in the future and operate at the current or increased levels.

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Evaluation Section

1. To assess the achievement of sustainability globally:
    a. There is only one main tool or indicator, which is called the Ecological Footprint Analysis (EFA).
    b. There is only one main tool or indicator, which is called the Cost Benefit Analysis (CBA).
    c. There are several tools and indicators, which are often used for supporting decisions related to a project or a policy.

2. To assess the achievement of sustainability globally:
    a. There are retrospective tools, but also some try to estimate what can be the sustainability in the future.
    b. Can only be assessed with the Human Development Index, since it is human welfare what matters.
    c. None of the tools can make any judgment or estimate on risk, uncertainty, or vulnerabilities, which also tend to be present in urban farming.

3. Regarding the indicators and environmental-social-economic accounting tools, especially regarding economic and physical flows:
    a. Policy makers and consumers take full consideration of supply-chain efficiency, urban symbiosis, ex-situ environmental benefits and participation processes, and this is reflected in the social and environmental balance.
    b. Supply-chain efficiency is irrelevant, trade is global and nowadays no one cares about the to “food miles” (distance that food travels) or carbon/water footprints (the emissions or water embodied in the products up to consumption).
    c. **The perspectives of life cycle assessment (LCA) and input-output analysis (IOA) have to do and are useful to analyze food supply chains and the social/environmental footprints (the pressures or impact of consumption).**

4. Among some institutions it has been proposed that the “**sustainability** of [urban agriculture] basically implies:
    a. The ability to perform the activity in harmony with the environment, even at the expense of social and economic factors.
    b. The ability to carry out the activity in harmony with social factors, even at the expense of social and environmental factors.
    c. The ability to perform the activity in harmony with the social factors, even at the expense of social and environmental factors.

5. In the literature on **indicators** and parameters for sustainability assessment of **urban farming:**

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a. It is and should be basically measured its capacity of producing food (crop and harvest count) and selling it, i.e., highlighting the economic data.
b. It is and should be basically measured its capacity of ensuring food security, but the main goal is preserving the environment.
c. It is and should be measured its capacity of producing food, but also analyzing environment, social, health and economic data.

6. In the relation of the **environment and economics**:
   a. There is only an accepted method which is called environmental economics.
   b. There is only an accepted method which is called ecological economics.
   c. There are at least about 2 broad tendencies, called environmental economics and ecological economics.

7. The Environmental economics perspective:
   a. Makes use of the concept of "externality", which is defined as the cost or benefit incurred or received by a third party who did not create it
   b. Makes use of the concept of "externality", which is defined as the cost or benefit incurred or received by all stakeholders (those creating the benefit or degradation of the environment, and those suffering it).
   c. Does not makes use of the concept of "externality", since its reductionist.

8. The Ecological economics perspective:
   a. Purely incorporates economic insights and excludes other sciences ones.
   b. It is more an interdisciplinary field addressing the interdependence and coevolution of human economies and natural ecosystems
   c. The economic thinking is at the center of the analysis, being nature a subsystem the economics system and equilibria.

9. Cost Benefit Analysis (CBA), especially when performed by institutions to assess the value of an activity:
   a. Ideally should account for all (private and) social costs and social benefits incurred or obtained.
   b. Should just account for the private costs and benefits incurred or obtained.
   c. Should account for the costs/benefits incurred/obtained only by farmers.

10. From some guides and resources available from several universities, colleges (e.g. CornellCALS, 2020) and institutions it is highlighted that urban farming:
    a. Ideally is always possible because codes and regulations allow it everywhere and one may find accessible land at some place.

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b. Can be made possible, but also profitable, paying attention to areas such as business planning, risk management and insurance, pricing, record keeping, or grant and financial opportunities.

c. Can be made profitable finding market price information and not wasting time in formalities such as keeping records, balance sheets, finances, etc.

11. Regarding the net benefits the standard way (business accounting) to measure them:
    a. Is to substract the revenues from the positive profit from costs.
    b. Is to substract the costs and other expenses (depreciation, taxes, interests and others) from the sales revenue to obtain the net benefits.
    c. Is to substract the costs and all other expenses (depreciation, taxes, interests and other general ones) from the sales revenue to obtain the gross benefits.

12. Profitability is about:
    a. The degree to which a business or activity yields profit or financial gain (net benefit, which is the difference between income and cost).
    b. The degree to which a business or activity yields reduces its costs at a maximum, differentiating the activity and being able to sell very cheap.
    c. To what extent a business or activity can get a higher share of the market.

13. Following the Individual simplified cost-benefit analysis example the 1st year the urban farmer obtains (that specific year):
    a. A yearly net benefit (2000 euro if measured in the “pragmatic” form)
    b. It does not obtain benefit or loss
    c. A yearly net loss (-22100 euro if measured in the “pragmatic” form)

14. Following the Individual simplified cost-benefit analysis example the 2nd year the urban farmer obtains (that specific year):
    a. A yearly net benefit, higher than the 1st year
    b. A yearly net benefit, smaller than the 1st year
    c. A yearly net loss

15. Following the Individual simplified cost-benefit analysis example the 3rd to 5th years the urban farmer obtains after taxes (for each year):
    a. A yearly net “pragmatic” benefit of 1000 euro
    b. A yearly net “pragmatic” benefit of 850 euro
    c. A yearly net “pragmatic” loss of -550

16. Following the Individual simplified cost-benefit analysis example the 3rd to 5th years the urban farmer obtains:

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a. **Not a benefit or loss according to standard business accounting (4500 euro in sales, and the same in costs once added the yearly depreciation)**
b. A negative value of assets since the tractors/machinery are totally depreciated.
c. Consistent yearly losses no matter how it is measured (in "pragmatic" or standard business accounting forms).

17. Following the Individual simplified cost-benefit analysis example if the 6th to 15th year the farmer incurs in the same costs and benefits than the 3rd to 5th years:
    a. The standard business accounting provides net benefits of 1000 euro.
    b. The "pragmatic" accounting highlights investment as costs when done (1st year), while the standard way does it yearly (as depreciation), but in the example there is a global net loss after the 15 years period.
    c. The standard business accounting provides net benefits yearly and globally (after the 15 year period).

18. Following the Individual simplified cost-benefit analysis example assessing the depreciation, the value of assets, and return of assets in the 4th year:
    a. With standard business accounting the value of assets is 20000 – 4*15000/15 = 16000 euro.
    b. The Return on Assets is obtained from the gross benefit times the assets.
    c. With standard business accounting the depreciation value is 20000 – 4500 = 15500 euro.

19. Following the Individual simplified cost-benefit analysis example if the 6th to 15th year the farmer has the same costs and benefits than the 3rd to 5th years, then:
    a. Obtains a net "pragmatic" benefit every year and at the year 15 has global net benefit (along the 15 years, also if measured as standard business accounting, SBA).
    b. Obtains a net "pragmatic" benefit every year and at the year 15 has a global equal costs and benefits (along the 15 years, also with SBA).
    c. Obtains a net "pragmatic" benefit every year but at the year 15 still has a global net loss (along the 15 years, also if measured as SBA).

20. Some farmers sometimes do not account their own personal or family labour time as costs (in the example, of the 2 people). Following the Individual simplified cost-benefit analysis example the farmer would be "artificially" accounting in that case:
    a. **A yearly net "pragmatic" benefit from the 2nd year onwards and a global net benefit after the 15 years.**
    b. A net "pragmatic" benefit from the very 1st year and onwards and a global net benefit after the 15 years.

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c. A yearly "pragmatic" net benefit from the 2nd year onwards but still a global net loss after the 15 years.

21. Some farmers sometimes do not purchase durables but either rent or share them with others. Following the Individual simplified cost-benefit analysis example if at the initial moment does not buy tractors/machinery (worth 15000 euro, with 15 years of useful life) but spends only 200 euro per year (e.g. as rent) obtains:
    a. A net (both "pragmatic" or SBA) benefit from the very 1st year and onwards.
    b. A yearly net (both "pragmatic" or SBA) benefit from the 2nd year onwards.
    c. A yearly net (both "pragmatic" or SBA) benefit from the 3rd year onwards.

22. Some farmers sometimes do not purchase durables but either rent or share them with others. Following the Individual simplified cost-benefit analysis example if at the initial moment does not buy tractors/machinery (worth 15000 euro, with 15 years of useful life) but spends only 200 euro per year (e.g. as rent) obtains:
    a. A global (after all the 15 years) positive net benefit.
    b. A global (after all the 15 years) net benefit equal to 0 (costs equal income).
    c. A global (after all the 15 years) net loss.

23. Sometimes there are funds/subsidies to acquire assets. Following the Individual simplified cost-benefit analysis example if at the initial moment buying tractors/machinery (worth 15000 euro, with 15 years of useful life) have a subsidy of the 50%, while renting it has a cost of 500 per year. We assume that no interest is paid/obtained for needing/having money and money does not lose value over time:
    a. The investment still costs more than renting it every year (counting all 15 years).
    b. The investment costs less than renting it every year (counting all 15 years).
    c. The investment costs the same than renting it every year (counting all 15 years).

24. In the Individual simplified cost-benefit analysis example:
    a. Only private costs and benefits are considered (no social costs/benefits).
    b. Private and social costs and benefits are considered.
    c. Only social costs and benefits are considered (no private costs/benefits).

25. In the Individual simplified cost-benefit analysis example, accounting globally for 15 years of activity:
    a. Global private losses are found (accounted) for the farmer, but perhaps there are other potential social benefits that are not accounted for and could justify/argue in favour of subsidizing the activity or certain ways of producing and selling the food, etc.

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b. Global private benefits are found for the farmer, but perhaps there are other potential social costs that are not accounted and could justify/argue in favour of penalizing the activity or certain ways of producing and selling the food, etc.
c. Global private and social losses are accounted for the farmer, perhaps to argue in favour of penalizing the activity or certain ways of producing.

26. The literature and the interviews to urban farmers tend to reveal:
    a. In general, all of them tend to get profits, being one of the activities with the highest profits and return to investment.
    b. In general, all of them tend to get losses but survive from subsidies.
    c. Profitability tends to be mixed, showing some with wins, some with losses, some break-even (also several of them do not perform the activity for profit, or do not fully account for the costs and benefits).

27. In relation to the social costs and benefits, urban farmers tend to:
    a. Be a nuisance for the society, since water gets very polluted and no benefits can be obtained.
    b. Provide social and environmental benefits, e.g. producing food near the place of consumption, with short supply chains, etc. Furthermore, non-profit farms aim to benefit the greater good of the community.
    c. Are totally neutral to other people, since urban farming is performed by an individual, typically alone, and without interaction with society.

28. In some works (e.g., **Dorward et al., 2013**) it is highlighted that:
    a. Some of the urban farming provides social and environmental benefits and complementary activities (being monetized/commercialized or not) such as garden planning, soil management, seed saving, hosting summer camps, teach agriculture, etc.
    b. Urban farming is only about producing food and ensuring food security.
    c. Urban farming is only about showing to 'urbanites' what regular farming does, and charging them since all of them are willing to pay.

29. In some works (e.g., **Dorward et al., 2013**) it is highlighted that:
    a. Urban farming can only succeed in exporting food outside the cities, where they cannot get the flavours provided by the city soil, and are the only ones that would appreciate the "edible landscaping".
    b. Urban farming cannot succeed in urban farm workshops, community programs or consulting since 'urbanites' do not care about food security or local foods.
    c. Some 'urbanites' have an increasing concern about food security and interest in local foods, even some are willing to pay for the expertise.

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30. Interviewing urban farmers about COVID19 times in Spain, the developers of the module were in general told:
    a. That all for-profit urban farmers had to close down their activities since they could not produce.
    b. That although there were some temporal restrictions to attend the land, for profit urban farmers found in consumers an increasing concern and actual purchase of local, healthy food, and increased their sales.
    c. That for-profit urban farmers found that consumers relied less in their products and more on the packaged food, loosing plenty of sales.

31. As a government decision maker (or an institution concern with the social/global welfare, etc.), regarding urban farming I should be interested in:
    a. Only the for-profit urban farmers which are the ones that can provide revenues and hence income from taxes to the government.
    b. Knowing what it provides to all members of society, looking at the aggregated view, to understand all positive and negative aspects.
    c. Should be only focused in the negative aspects that urban farming may imply, penalizing/taxing/prohibiting those activities if there are any complaints.

32. As a government decision maker (or an institution concerned with the social/global welfare), regarding urban farming, I should know and analyze that:
    a. Urban farming can have a positive impact in aspects such as greening the city or providing ecosystem services.
    b. Urban farming always has just positive impacts in the city, greening it, improving the climate, the water quality, the cultural diversity, etc.
    c. Urban farming has positive impacts in the city, by reducing food production in rural areas, attracting and concentrating population in the city, improving the soil and water conservation and completely altering the climate.

33. As a government decision maker, regarding helping/penalizing:
    a. At all levels (we) have the tax and punishment instruments.
    b. At some levels (we) the instrument of subsidies, to always help urban farming, but (we) cannot limit at all the conditions of how the activity is carried out, because we live in a free market society.
    c. It depends on the level of administration (city/state/nation), but in general governments have some instruments for taxing, penalizing or prohibiting damaging activities, as well as some instruments (e.g. subsidies, legislation, etc.) to support activities which are found desirable.

34. How academics, policy-makers, and practitioners see urban farming?

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a. **There are some discursive framings about the socially inclusive city, the sustainable city, etc. and has attracted attention around them.**
b. Urban agriculture is in general seen as the solution to provide all the food needs of growing urban populations.
c. Both a and b are correct.

35. Regarding how local governments, but also foundations, and businesses relate to urban farming?
    a. Some provide in-kind and financial donations urban farming social enterprises, but these are always unsuccessful and do not create jobs or return to communities.
    b. Some have made grant funding available to support organizations devoted to sustainable local food production, especially to non-profit urban farming.
    c. These entities never had or have any relation to urban farming.

36. Regarding the relation with municipal governments:
    a. Local authorities cannot review of codes and city ordinances that may inhibit the development of urban agriculture, nor promote the activity, so as a government there is nothing that municipalities can do for urban agriculture.
    b. **Can be considered opportunities to connect compost programs to urban agriculture, support its relation to locally-owned stores and sale of local products, support programmes around waste and recycling, etc.**
    c. Option a is true but b is false.

37. Regarding best practices and recommendations:
    a. These can only be learned by developing the activity of urban farming.
    b. They are general and applicable everywhere, being focused on saving money, while other aspects such as resource use efficiency, environmental pressures or planning are not of concern.
    c. **Although these are quite context dependent and specific, which might be learned with practice, guides for urban farming have been developed (e.g. in the module there are references for Chile, Spain, Canada, etc.).**

38. Regarding best practices and recommendations, at the farmer level:
    a. Improving resource efficiency is often highlighted with the notion of 'doing more with less', or at least, 'never using more of a resource than needed'.
    b. It is recommended to not "recycle" materials and getting rid of waste products wherever to reduce costs.
    c. Option a is false but b is true.

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39. Resource efficiency:
    - **a.** Does not matter since the key in urban farming is to produce more with the resources and inputs available, which tend to be abundant in cities.
    - b. **Has to with using limited resources in a sustainable manner while minimising impacts on the environment.**
    - c. It allows us to get less (output) with more (higher use of inputs).

40. Regarding best practices and recommendations, it is important:
    - a. To exhaust the soil and the use of resources every year to avoid surpluses.
    - **b. Food safety, producing healthy, keeping & creating a healthy environment.**
    - c. To avoid biodiversity, because it always generates pests and problems.

41. Regarding best practices and recommendations:
    - a. Since urban farming is starting, there are very few; anyhow the activity of urban farming cannot produce many challenges nor contaminate the urban environment.
    - b. It is highly recommended to focus on water pollution indicators, but not on soil quality indicators, because it does not change in urban areas.
    - c. **Agrochemical residues or excess nitrate may worryngly pollute water.**

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Activities / Exercises

1. According to what we have seen, is there only one view to understand and measure the relation of humans –and hence of urban farming- with nature in economics?

2. What type of tools can be used to start evaluating costs and benefits of urban farming? What are the main costs and factors to consider (hint, use the USDA Toolkit provided at the end)?

3. But furthermore, is there a difference between what is individually best and socially best? How can these be communicated and considered in a collectivity?

Practice

The main practice task of this module is to try to establish/estimate what are going to be the individual costs and benefits over the years (e.g. up to 10), in order to start assessing the economic sustainability of your activity. This can take the form of the box above on the Individual simplified cost-benefit analysis example, doing it more comprehensively and with reasonable figures for your area/country.

Additionally, at least qualitatively, to be able to inform on the aspects (especially benefits) that the urban farming may provide for the society and environment, in terms of relating it to public policies/grants/etc.

* Investment costs (which are incurred only):

* Maintenance and regular activity costs (of inputs, which are incurred every year):

* Private benefits:

* Social benefits (at least qualitatively) to inform institutions and, if selling the product, to consumers:

* Social costs:

Additionally, if as in **Module 3** you go to a nearby urban agricultural area, it would be interesting to trying to find what important elements, i.e. inputs or factors of production (e.g. water, machinery) are or can be shared among farmers around the area.

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Useful resources for the lesson

https://farmingconcrete.org/toolkit/ (Farming_Concrete, 2015)

Urban Agriculture Tool Kit - USDA (USDA, 2016)

Urban Guide to Farming in NY (CornellCALS, 2020)

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