



UNITED NATIONS
UNIVERSITY

UNU-IAS

Institute of Advanced Studies

UNU-IAS Policy Report

Integrating Biodiversity with Local and City Planning: The Experience of the Studios in the Development of Local Biodiversity Strategies and Action Plans - LBSAPs



Urbanization



Waste/Pollution



Biodiversity



Settlements



Livelihoods

In collaboration with:

American University of Armenia (AUA)
Federal University of Minas Gerais, Brazil
Gadjah Mada University, Indonesia

School of Planning and Architecture – Bhopal, India
[Technical Federal University of Paraná \(UTFPR\), Brazil](#)
University of Béjaïa, Algeria
University of Santiago de Compostela, Spain

Integrating Biodiversity with Local and City Planning: The Experience of the Studios in the Development of Local Biodiversity Strategy and Action Plans - LBSAPs

Authors:

**José A. Puppim de Oliveira
Wan-yu Shih
Raquel Moreno-Peñaranda
Adele Phillips**

In collaboration with:

**American University of Armenia (AUA)
Gadjah Mada University, Indonesia
School of Planning and Architecture – Bhopal, India
~~Technical Federal University of Paraná (UTFPR), Brazil~~
University of Béjaïa, Algeria
University of Santiago de Compostela, Spain**

Institutional support from:

**ICLEI – Local Governments for Sustainability
SCBD – Secretariat of the Convention on Biological Diversity**

Contributions by Christopher Doll, Osman Balaban, Andre Mader and Shela Patrickson.



**UNITED NATIONS
UNIVERSITY**

UNU-IAS

Institute of Advanced Studies

Content

Abstract	3
1. Introduction: Background	4
2 Biodiversity in Cities.....	6
3. Understanding Local Biodiversity Strategies and Action Plans - LBSAPs.....	8
4. Studios: procedure and initial outcomes.....	13
4.1 Principles to the studio exercises	13
4.2 Studio operations.....	14
4.3 Studio: problems and availability	14
5. Lessons learned from the studio	34
5.1 Lessons learned to improve studio exercises.....	34
5.2 Lessons learned to build LBSAP guidelines	34
6. Conclusions.....	36
References	37
Annex 1 - The Aichi Targets.....	39
Annex 2 - Studio General Guidelines for Testing LBSAPs (Local Biodiversity Strategies and Action Plans).....	42

Abstract

During the tenth Conference of the Parties of the Convention on Biological Diversity (CBD COP-10) held in Nagoya, Japan, in October, 2010, the Decision X/22 was adopted endorsing a *“Plan of Action on Sub-National Governments, Cities and Other Local Authorities for Biodiversity (2010-2020)”*. Nevertheless, there is a need to build tools that facilitate cities and local and sub-national governments in the implementation of this decision. Local Biodiversity Strategies and Action Plans (LBSAPs) can be the backbone for integrating biodiversity issues locally, while also advancing National Biodiversity Strategy and Action Plans (NBSAP) and CBD efforts. Nevertheless, developing a comprehensive LBSAP has several conceptual and practical challenges. How to incorporate biodiversity in local planning is a recent topic in practice, as well as in universities, particularly urban planning schools. Typical planning tools are limited in ability to address biodiversity. However, students of planning today will be the urban planners of tomorrow, who will influence the way cities are planned and developed. Therefore, UNU-IAS in partnership with ICLEI and SCBD worked together with eight universities around the world launching studios aimed at developing LBSAPs to understand the challenges of planning for biodiversity in local settings. The studios serve to both think about new techniques for working with biodiversity in cities as well as develop teaching material for promoting learning of biodiversity in cities. This publication summarizes the main lessons from the studios for developing LBSAP guidelines in eight cities around the world.

1. Introduction: Background

In 2010, the 193 Parties (192 national governments and the European Union) who were signatories to the Convention on Biological Diversity (CBD) adopted Decision X/22 at the tenth meeting of the CBD Conference of the Parties in Aichi/Nagoya, Japan. Adoption of the Decision also meant endorsement of a “*Plan of Action on Sub-National Governments, Cities and Other Local Authorities for Biodiversity (2010-2020)*”. This momentous decision, built on Decision IX/28 of COP9, supports and recognizes the critical roles that local governments play in reducing biodiversity loss and improving ecosystem management (www.cbd.int/authorities/planofaction.shtml). Decision X/22 provides guidelines for Parties to follow in order to facilitate support for local government, and thereby increase their success in national implementation of the CBD. The 2010 City Biodiversity Summit: Local Governments Acting for Biodiversity was a major event at which the “*Aichi/Nagoya Declaration on Local Authorities and Biodiversity*” was formulated and endorsed by local governments in support of Decision X/22. Local governments thereby committed to assist in implementing the CBD. This commitment was taken to the high-level segment of the CBD COP 10 in support of the *Plan of Action*.

The Convention on Biological Diversity (CBD) was agreed by world leaders in the Earth Summit in Rio de Janeiro, Brazil in 1992. It has three broad (and ambitious) objectives: the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits

COP Decision IX/28 calls for increased recognition and support for sub-national governments, cities and other local authorities, and puts forward their crucial role in securing ecosystem services and reducing biodiversity loss.

Through alignment with National Biodiversity Strategies and Action Plans (NBSAP), Local Biodiversity Strategies and Action Plans (LBSAP) are one of the key mechanisms for implementing the *Plan of Action*, and by which the CBD may achieve the Aichi Biodiversity Targets at the local level. Additionally, LBSAPs go hand-in-hand with national reporting, which is required of all CBD Parties. Compilation of LBSAPs and NBSAPs needs to be a collaborative effort between local and national governments. While LBSAPs can assist in implementing NBSAPs, they may also inform them and assist in establishing national targets and strategies. Likewise, in order to achieve the common goals of biodiversity conservation, local governments should take note of their nation’s NBSAP and align locally-defined objectives with it, and with the CBD’s Aichi Targets and Strategic Plan as well.

However, there are many aspects we need to understand in relation to how to introduce biodiversity concerns in local planning. Studios are exercises common in architecture and urban planning schools and help to simulate real world situations. The studio-based engagement of eight universities from different countries was a simulation exercise by which to shed light on the challenges of developing an LBSAP, utilizing actual city conditions (Figure 1, below). Based on the general framework of the LBSAP guidelines being developed by ICLEI/UNU-IAS/SCBD, the studios worked to draft a local-specific LBSAP, make constructive suggestions for building the guidelines, and develop new approaches to technical and process aspects related to LBSAPs.



Figure 1 - Location of the studios

2. Biodiversity in Cities

Increasing biodiversity loss and rapid urbanization are two key ingredients of today's global development pattern. At no other point in world history has biodiversity been lost at such alarming rates, and neither have cities grown as large, and as quickly. Biodiversity and ecosystem services are the critical foundation upon which humankind ultimately depends in order to attain a better quality of life. This is true for cities worldwide, in which access to nature is seldom adequate, whilst demand for natural goods and services to satisfy urban lifestyles continues to increase rapidly. Ascertaining the positive and negative influences between cities and biodiversity, and understanding the role that urban nature plays in sustainability and well-being—both within and beyond city boundaries—is a complex endeavour, yet a much-needed one in our time.

Ecosystem services are the benefits people obtain from ecosystems. These include provisioning, regulating, and cultural services that directly affect people and the supporting services needed to maintain other services (MA, 2005).

It is broadly acknowledged that cities can contribute significantly to biodiversity loss and degradation in a direct way, by appropriating land for urban development and changing natural habitats (Mckinney, 2002; Sukopp, 2004; Whitford et al., 2001). Urban development, characterized by a high proportion of impervious surfaces and a high ratio of built spaces to green spaces, can induce the extinction of native species and the replacement of native species with alien (non-native) species, especially along rural-urban gradients (Mckinney, 2002; Zerbe et al., 2003). The Urban Heat Island Effect (UHI), which is evidenced by the temperature difference between cities and their cooler surrounding environs, is increasingly recognized as a biophysical hazard specific to cities which further tests urban biodiversity (Landsberg, 1981; Foley, 2005; Shochat et al., 2006; Bradley and Altizer, 2007).

Additionally, urbanization has brought deep changes to human lifestyles, including consumerism (Davis, 2000). Increasing disposable incomes translate into greater demand for environmental goods and services, which is often met by unsustainable production processes that negatively affect biodiversity outside municipal boundaries. It is estimated that cities currently consume 75 per cent of the Earth's resources (UNDESA, 2009), and thus have significant regional and global-scale impact on biodiversity beyond their borders. Moreover, more affluent cities tend to appropriate higher shares of natural resources outside their boundaries (Folke, et al., 1997). It is important to acknowledge that cities are additionally tied to the major threats to biodiversity loss through public services and policy instruments for which city governments are directly responsible (SCBD, 2007). Major human drivers of biodiversity loss are habitat destruction, introduction of alien species, overexploitation, pollution and climate change (MA, 2005). For example, air pollution (Tickle et al., 1995) and water pollution (MA, 2005; SCBD, 2010), related to some extent to urban activities, can negatively affect biodiversity in and around cities. Likewise, urban areas can be responsible for the expansion of anthropic plant species to nearby areas (Säumel and Kowarik, 2010).

It is not often well understood that urban ecosystems provide many essential ecosystem services for the city, and that planning for, conserving, and managing urban and peri-urban biodiversity can provide many positive benefits for city dwellers. First, it is important to highlight that urban biodiversity is crucial not only for the proper functioning of ecological processes, but for the capacity of the urban area to absorb changing conditions as well (Elmqvist et al., 2003). Urban health, as much as ecological health, refers to the capacity of a system to recover and self-renew (Sontag and Bubolz, 1996).

Ecosystem services provided by urban nature include air pollution regulation, micro-climate regulation, noise reduction, rainwater drainage, sewage treatment and numerous recreational/cultural services (Bolund and Hunhammar, 1999). In the same manner, food and other ecosystem services (e.g. sanitation, nutrient recycling) can be provided through urban agricultural activities, particularly in cities situated in developing nations (Pearson et al., 2010). In addition, projected impacts of climate change—which is predicted to be one of the greatest threats to biodiversity—will pose additional challenges for urban areas, and therefore to the continued provision of ecosystem services as well. At the same time, maintaining healthy biodiversity contributes significantly to the resilience of a city in the face of climate change, as intact ecosystems can both reduce the impacts of extreme weather events and improve food and water security. Urban biodiversity can also play a role in sequestering carbon, thus managing greenhouse gas emissions.

Understanding linkages between cities and biodiversity is a complex task, as intricate positive and negative influences between them can occur across multiple scales (Puppim de Oliveira et al., 2010). Even though cities only occupy approximately 2 per cent of the Earth's land surface, over 50 per cent of today's world population lives in cities, and this is estimated to rise to 90 per cent by the year 2100. Thus planning and building biodiversity-friendly cities remains a most vital challenge for the cities of tomorrow. Urban green areas, such as parks, lawns and urban forests, are the major sources of biodiversity in and around cities. Therefore, provision of a network of green spaces is among the most effective instruments by which to preserve and enhance urban biodiversity (Niemela, 1999). Enhancing conservation in peri-urban areas also improves biodiversity in parts of the inner city (Sneep et al., 2006). It is worth noting that cities also present multiple opportunities for biodiversity conservation and sustainable development due to the fact that cities are of the local level where implementation and action take place, and where high population concentration can drive positive changes through informed decision-making and public education and awareness (Puppim de Oliveira et al., 2012). Cities also offer huge potential as global centres of innovation, often containing academic and research institutes. It is often at the source of a problem that solutions can be found by the very people affected by these challenges.

The discussion on how to integrate biodiversity in urban planning is recent. There is very little coverage of biodiversity in planning schools. The typical physical planning tools are limited in their ability to address biodiversity, a concept which is sometimes confused for 'green areas'. However, students of planning will be the practitioners of tomorrow, and will influence the way cities are planned and developed. A lack of both understanding and tools impedes the advancement of the biodiversity agenda in urban planning, particularly those concerning the implementation of the CBD. For these reasons, the studios aimed at understanding the challenges of designing for biodiversity in urban planning. The studios serve to both think about new techniques for working with biodiversity in cities, as well as to develop teaching material for promoting learning of biodiversity in cities.

3. Understanding Local Biodiversity Strategies and Action Plans - LBSAP

What is an LBSAP?

Local Biodiversity Strategies and Action Plans are mechanisms for implementing the CBD and Aichi Biodiversity Targets at the local level, through alignment with National Biodiversity Strategies and Action Plans. Basically, LBSAPs are an overarching strategy accompanied by specific actions to achieve that strategy. It is a crucial tool by which local governments may guide the management of biodiversity and ecosystem services, enable local action, and inform overarching city plans and decisions. In addition, the LBSAP guides the city's impact on biodiversity and ecosystem services beyond its boundaries. The LBSAP can be a standalone document, or can provide a mechanism for integrating biodiversity and ecosystem services considerations into broader city plans.

Note that the terms "local government", "city" and "local authority" are used interchangeably and are all understood to have essentially the same meaning unless indicated otherwise.

The foundation of an LBSAP is an assessment of the biodiversity and ecosystem services in the city, including their state, spatial distribution, management and threats, together with communication, education and public awareness (CEPA) activities. This assessment, which constitutes the first step of the LBSAP itself, provides the baseline data that can be used for monitoring progress and evaluating results. Additionally, the first step guides the process of prioritization of objectives and the identification of gaps, local priorities and targets; ultimately serving as a basis for better-informed planning into the future.

The ultimate goal of a city embarking on the LBSAP process is to implement the specific actions described in the LBSAP. In order to do this, it is essential to integrate the LBSAP into the overarching city plans, and to mainstream the plan throughout all departments and line functions as a cross-cutting theme. While seemingly obvious, it is critical to establish implementation of actions related to further the objectives of CBD as the goal of the LBSAP, and to include specific implementation actions within the action plan. Some actions may include: the establishment of protected areas, the establishment and enforcement of laws and policies to protect and conserve biodiversity, and the expansion of biodiversity education and awareness rising.

Why LBSAPs?

LBSAPs can be a valuable, integrated planning tool by which local governments may manage internal and external biodiversity, and build a healthy and sustainable future for city dwellers as well as globally for all, whether living in urban or rural settings. LBSAPs require a holistic and inclusive approach to plan for and manage the linkages between ecology, economy and society in order to ensure equity and build a sustainable city. That is, urban economic and social development must be planned for and undertaken in conjunction with, and in consideration of, biodiversity conservation, sustainable use, and equity—the three objectives of the CBD. It is worth noting that despite being a local policy instrument, LBSAPs have the potential to make a significant contribution to reducing biodiversity loss at a global scale. This is because urban areas are such significant consumers of the world's natural resources, the majority of these originating outside the city's boundary. It is therefore paramount that cities incorporate consideration of biodiversity and ecosystem services into city management in order to sustainably manage

these critical natural resources in light of climate change, urbanization, land-use change and other current global and local environmental challenges.

Integration of LBSAPs with other biodiversity measures

The CBD Strategic Plan for Biodiversity (2011-2020) outlines 5 strategic goals, under which there are 20 Aichi Biodiversity Targets (see Annex 1). It is necessary for national governments to align their own goals and targets under the overarching CBD strategic plan. Local governments should therefore also align with both, in order to ensure continuity in planning for biodiversity. This ensures that messages are consistent, and that all biodiversity activities strive towards the same outcomes.

As outlined in the CBD module on developing sub-national biodiversity strategies and actions plans (SCBD, 2011), LBSAPs can assist in translating international and national biodiversity policies and targets into implementable action at the local level. LBSAPs thus may be a mechanism for connecting and aligning the different government levels. LBSAPs should feed into and inform sub-national and national BSAPs, may be a useful mechanism for assisting National Governments in biodiversity reporting and monitoring.

Because LBSAPs are locally adapted and specific to a unique context, the involvement and ownership of the process by local authorities, decision-makers, and indigenous communities is encouraged. This provides an avenue for improved sectoral and cross-sectoral mainstreaming of biodiversity. LBSAPs can also help to integrate biodiversity concerns into spatial and regional planning, and may provide a mechanism for strengthening partnerships and collaboration around key issues.

It is also important to align LBSAPs to regional and sub-national objectives, and the biodiversity strategies and action plans (BSAP) at these levels. Ideally, national, sub-national and local BSAPs will be developed in conjunction and in collaboration with each other. In reality this is often not feasible, and therefore local authorities should take note of the existence and details of relevant BSAPs at other government levels.

At the local level, it is crucial that LBSAPs reflect the local government and city objectives, and integrate biodiversity and ecosystem objectives into the master plan for the city. LBSAPs should not be developed independently from the rest of the city's plans, and care should be taken to find compromises in areas or aspects of conflict.

At the national level, alignment of LBSAPs with NBSAPs should be a collaborative effort between local and national governments. While LBSAPs translate national targets into effective action at the local level, and improve the reporting and implementation of NBSAPs, they should also inform the NBSAP and assist in establishing national targets and strategies in line with the CBD.

At the international level, LBSAPs should align with existing development priorities, such as the Millennium Development Goals (MDG), especially Goal 7: Ensure Environmental Sustainability. The premise of the LBSAP is that locally designed actions can contribute both effectively and cost-efficiently towards national and global sustainability and development objectives.

Preparing an LBSAP

The principal elements of an LBSAP typically include: a biodiversity assessment (species, agricultural varieties, habitats and management); an assessment of the conservation status of species within ecosystems; the creation of priorities and targets for conservation and restoration; and, the establishment of budgets, timelines, responsibilities and partnerships for implementation. The plan should incorporate costs and timeframes, specifying which organizations or staff will implement each measure of the clearly identified medium and long-term goals.

The compilation of the LBSAP should be a consultative process, and the relevant stakeholders' interests, roles and responsibilities should be determined as part of the process. Communication, education and the raising of awareness of the document itself—as well as for biodiversity and ecosystem services—should also be part of the action plan.

Steps of an LBSAP

There are seven basic steps in an LBSAP:

- 1) **Collecting and assessing existing data and information.** An LBSAP starts by assessing existing data and information to comprehend the specific characteristics of local biology, ecology, socio-demography, and urban development before conducting investigations in the field. National, regional, and local ecological databases can provide valuable information. Alternatively, existing surveys, records, photos, maps, projects, and studies related to the city's ecosystems and environmental changes can also be valuable. In addition to local ecosystems, areas outside the municipal boundary but providing ecosystem services to your locality should be also taken into account. In the absence of publicly available data, interviews with various experts and experienced citizens can give a general assessment of the situation.
- 2) **Identifying relevant institutions and reviewing associated regulations, policies, programmes and projects.** This step identifies the institutional structures that are involved in the utilization, planning, implementation, and management of the ecosystem services of the city. Additionally, this step identifies the institutions that might be useful for further cooperation when designing and deploying the LBSAP.
- 3) **Assessing and mapping assets, biodiversity, ecosystem functions and threats.** Robust data are the backbone of an LBSAP. After data collection is completed, mapping assets and evaluating their functions and threats provides visually explicit information that aids communication, and facilitates the integration of biodiversity conservation into a city plan. Current instruments to facilitate this step include the City Biodiversity Index (CBI) formulated by CBD and the TEEB Manual for Cities, and others such as the Green Infrastructure Assessments (GIA).
- 4) **Formulation of the LBSAP.** Based on the results of steps one through three, a process to develop strategies and action plans is carried out. This process generates information regarding where and what changes are required, and which methods and timeframe will be necessary. The involvement of relevant stakeholders is important in order to give legitimacy to the LBSAP, as well as to feed more information into the process. The LBSAP should: fit into the broader city plan; be aligned with the relevant Aichi Targets and the existing NBSAP and Sub-national Strategies and Action Plans - SBSAPs; be reviewed and updated over time; and contain actions of cross-boundary compliance.
- 5) **Implementation and management.** Once the LBSAP has been formulated, a series of actions—for which budget has been acquired—need to be taken according to

a targeted timeframe, and in collaboration with identified agencies and partners. It is recommended to develop innovative approaches that incorporate culture and traditions, especially with regard to social inclusion and the improving of livelihoods of local communities.


- 6) **Monitoring, evaluation, and reporting.** The LBSAP process is an ongoing endeavour than can expand over several years. In order to ensure that original targets are achieved, a mechanism for regular monitoring and evaluation has to be put in place, and be reported to the relevant actors involved in the process.
- 7) **Consulting and cooperating with partners.** The LBSAP requires working closely with the general public and relevant stakeholders. Consultation and cooperation with partners is required—along with steps one through six—in order to develop effective partnerships that will: assist in decision-making and implementation—including the revision of relevant policies and strategies—and deliver appropriate actions and audit progress.

The studios will work mostly in the items 1 to 4, but can generate ideas for items 5-6, and simulate item 7 during the exercise for items 1-4.

Mainstreaming the LBSAP into other plans

Biodiversity is an important, yet often unacknowledged, component of almost all economic, social and environmental sectors in the city. Almost all sectors will have some influence on biodiversity, either directly or indirectly. Healthy ecosystems are the foundation for sustainable cities, and influence most economic activities, as well as human well-being (TEEB 2011). The critical role that ecosystem services play in cities is often not well understood, but cities have the opportunity to make some very positive changes if ecosystem services are considered throughout all sectors, such as: reducing municipal costs, boosting local economies, increasing resilience in light of climate change, and enhancing quality of life and securing livelihoods.

By ensuring that all sectors are aware of the value of biodiversity, and the opportunities and trade-offs varying between multiple policy options, plans or infrastructure choices, better informed decision-making may be achieved. The provision and sharing of information will improve understanding about the effects of decisions on biodiversity, and contribute to more efficient planning in order to reduce the loss of essential and beneficial ecosystem services. Inadequate understanding and planning can lead to losses in biodiversity, which lead to losses in local benefits, in turn reducing opportunities for business, economic gain and secure livelihoods. If ecosystems are degraded past a certain tipping-point, the supply of ecosystem services on which the city relies will cease, and it can be extremely expensive, time-consuming, and sometimes even impossible to restore the ecosystems and/or find an alternative solution.

Communication, education and public awareness (CEPA) is a critical element for mainstreaming biodiversity and ecosystem services into city governance and management, between departments in the local government, other stakeholders, and sub-national and national government. **Gaining cooperation between stakeholders and instilling a sense of responsibility towards biodiversity is essential, is a challenge that is cited again and again by local governments, and requires the strategic use of CEPA** 

In order for the LBSAP to be successfully mainstreamed, biodiversity needs to be integrated into existing planning processes through the instruments and actions designed

in the LBSAP. Any plans developed independently are unlikely to be implemented, and integrated management is necessary in order to contribute to the running of an efficient city. By strengthening partnerships between sectors and stakeholders, each partner will bring different background knowledge, skills and information which will be combined to the benefit of all partners. Conversely, the LBSAP needs to take into consideration and incorporate other planning processes. Establishing these partnerships and involving all sectors and stakeholders from the beginning, ~~this~~ ensures that each sector will be cognisant of the various objectives, priorities and action plans of the others. This integrative process is the first step in making sure that the plans for each sector support one another, and the mainstreaming of the LBSAP.

In order to understand the best way to produce this integration between local development and biodiversity, a series of studios around the world were run by several universities in different countries. The studios were the first attempt to identify the main challenges of producing an LBSAP in a short period of time.

4. Studios: procedure and initial outcomes

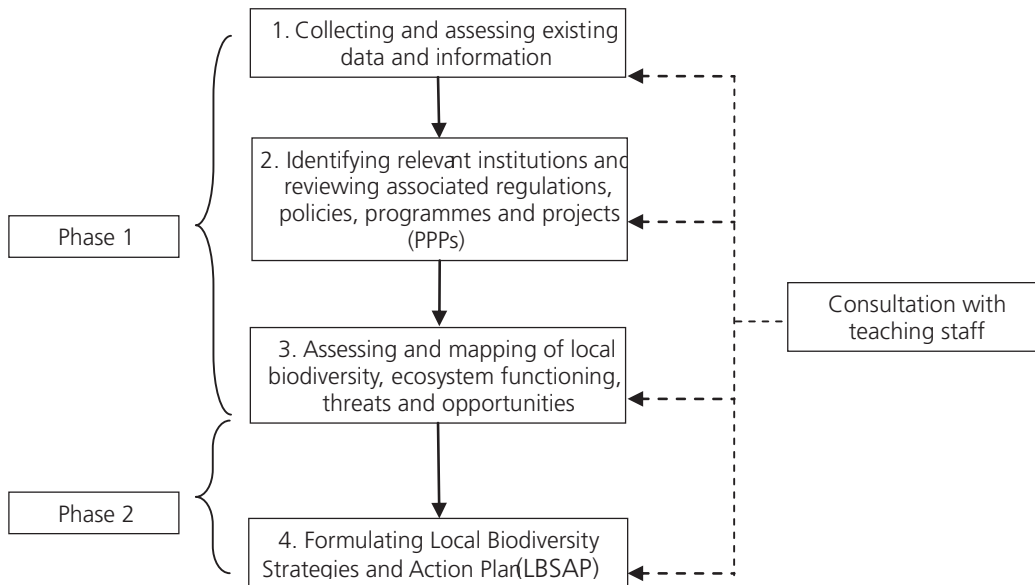
The studios are an important part of building robust LBSAP guidelines, because they are run in order to simulate practice, can help identify many shortcomings in the guidelines, and can help to develop new methodologies and tools for planning. Around the world, studios are commonly run in courses of architecture and urban and regional planning for undergraduate and graduate students. The LBSAP studio guide was adapted to fit the already existing scope of studio exercises. However, the guide may be used by students and instructors in other fields, such as: ecology, engineering or economics. LBSAPs are a good exercise for universities to engage in, because such exercises may provide a dynamic space for interdisciplinary interaction, and local government and stakeholder engagement. Understanding that the customary operations of the universities may vary—while remaining within a similar discipline—each participant university was allowed to adjust the guidelines and design an appropriate schedule as necessary (see Annex 2).

4.1 Principles to the studio exercises

It was suggested that the studio included both lectures and field exercises under the supervision and guidance of a group of experts. Given that the understanding of the local biodiversity conservation requires multi- and inter-disciplinary knowledge, the instructors coordinating the studio were encouraged to involve teaching staff from different disciplines and backgrounds, such as: biology, ecology, geology, urban planning, architecture and landscape architecture. The inclusion of not only experts in academia, but also professionals—from governmental and non-governmental agencies, and the local population—who possess expertise and knowledge on local flora, fauna, conservation, ecosystems and land use aspects of the case study area was also suggested.

Studios were advised to utilize their home city as the case study. As the studio was supposed to be run within a short period of time (from intensive two weeks to around four months), the familiarity toward a case study area would help studios in data collection and the following steps. According to the LBSAP guideline, four key processes were developed for the studio exercise:

1. Collection and assessment of the existing data and information on biodiversity in the case study area.
2. Identification of relevant institutions and review of the associated governmental documents including laws, regulations, policies and programmes concerning biodiversity preservation in the case study area.
3. Assessment and mapping of local biodiversity and ecosystem functioning, as well as threats and opportunities.
4. Formulation of the Local Biodiversity Strategies and Action Plan (LBSAP) for the case-study city.



4.2 Studio operations

Considering the fact that each participating university has distinct operation customs and academic calendars, the studio guidelines were prepared to give a general framework, leaving room for participants to design a school-specific curriculum. As such, the process and the scale operated in eight participating universities varied. Some universities conducted the studio with interdisciplinary instructors and mixed-background students, whilst some operations comprised both instructors and students from singular backgrounds. The scale differed in that the number of student participants varied from 2 in the Spanish city of Lugo, to 22 in Curitiba, Brazil.

For the studio in Yerevan, Armenia, a summer course entitled “Built Environments and Biodiversity” was prepared with a well-designed syllabus. The six-week course comprised field exercises (see Box 1) and lectures, which introduced general concepts of human-ecosystem interrelation, local ecological and planning characteristics, and the LBSAP. The studio included three instructors from different academic institutes and eight participant students, mainly from Yerevan State University’s Department of Architecture and Construction.

In Curitiba, Brazil, the project entitled “STUDIO - Cities and Biodiversity” took place from March to June, 2012, at the Curitiba campus of the [Technical Federal University of Paraná \(UTFPR\)](#). The studio was well-planned and systematically operated twice a week with multi-institutional and multidisciplinary support. Participants included professors from four local universities, and students ranging from undergraduates to doctoral students to allow cross-level dialogues. (see Box 2)

BOX 1 - The Studio experience in Yerevan, American University of Armenia (AUA)

The studio in Yerevan, Armenia, was conducted by the American University of Armenia (AUA). It was operated as a summer course entitled “Built Environments and Biodiversity” with a well-designed syllabus. The course ran for six-weeks from 16 June to 21 July, 2012. It comprised field exercises and a series of lectures, which introduced general concepts of human-ecosystem interrelation, local ecological and planning characteristics, and the LBSAP. The studio included three instructors from different academia institutes and seven participant students, mainly from Yerevan State University’s Department of Architecture and Construction.

The case study area, the City of Yerevan, is the capital of the Republic of Armenia. The main focus of the studio was to collect baseline data and more importantly to discuss what to conserve in a semi-desert environment like Yerevan. Students were divided into five groups: green zones and natural habitats, water flows, plants and animals, biodiversity hotspots, and threats (e.g. mining, industry, and waste management).

The studio struggled in determining where and what to conserve in the semi-desert environment of Yerevan. Recognizing the fact that the biodiversity is not equally distributed, the studio came out with a decision to single out “biodiversity hotspots” from the rest of the city. Four biodiversity hotspots were identified, including two natural and two man-made areas. Students made site visits to three of these areas (the botanical garden, the Hrazdan Gorge, and the Nubarashen landfill) and conducted interviews with a number of people from associated organizations and universities.

It was the first time that an interdisciplinary and multi-institutional course is designed to offer academic credit in AUA. It was also the first time in Armenia for biodiversity concerns to be combined with urban development concerns. Students were interested in knowing how such a short-term studio might contribute to the decision making of local governments, which brings further thought of establishing a partnership between universities and governments.



The Studio included the following faculty members: Alen Amirkhonian; Karen Aghbalyan; and Sarhat Petrosyan. The participating students were from the Yerevan State University of Architecture and Construction and American University of Armenia: Anna Aktaryan, Siune Arakelian, Armen Hakobyan, Vahe Haroutunian, Arakel Poladian, Vardeni Vardanyan, Tatevik Zakaryan and Mher Beglarian.

BOX 2 - The Studio experience in Curitiba, Technical Federal University of Paraná (UTFPR), Brazil

In March 2012 the project entitled “STUDIO – Cities and Biodiversity Curitiba” (<http://studiobiodiversidade.wordpress.com/>) was launched at the Curitiba campus of the Technical Federal University of Paraná (UTFPR), located in Curitiba city, Brazil. The Studio included nine thematic areas, each linked to a working group, namely: 1. Biodiversity and Ecology; 2. Governance and Management; 3. Urbanization and Geography; 4. Social Development; 5. Urban Economy and Ecological Economy; 6. Production and Consumption; 7. Industrial Ecology; 8. Legislation; and 9. Languages (Portuguese and English). The Studio project was multi-institutional and multidisciplinary, including from undergraduates to doctoral students supervised by professors from different disciplines and departments.

Each working group was responsible for conducting weekly meetings and work on a report focusing on thematic axis aiming to generate a future publication. In order to fostering a positive, fruitful research experience, every week team members had the chance to access relevant biodiversity related information, particularly through lectures and seminars. This project experience has motivated cross functional interactions among young students and researchers from various areas of study and levels.

The “Studio Cities and Biodiversity – Curitiba” was successful in engaging with relevant partners, receiving important contributions both from the Public Sector and from NGOs, for example, Curitiba’s Municipal Agency for the Environment, the LIFE Institute (involved in certification of public and private sector biodiversity initiatives), CIFAL-Curitiba (the International Training Center for Local Actors in Latin America, working in increasing capacities of local stakeholders to achieve sustainable urban development), and the Brazilian Ministry for Environment, who selected a few studio participants and offered valuable space at a Rio+20 side event.

More importantly, the project has achieved its main objective: to create an LBSAP for the city of Curitiba. Significantly, students and professors alike have requested the Studio Project to be an ongoing initiative. The Studio is scheduled to continue through the end of 2014, and then be evaluated for a permanent programme at the university.

Findings from the Studios: Curitiba’s urbanization process and biodiversity policies

Urbanization in Curitiba follows a widespread model of social and spatial segregation common to many other Brazilian cities, resulting in wealthy areas equipped with full infrastructure and services, and peripheral areas lacking basic services and often settled through informal means. Typically growth and investment was stimulated across structural axes, so access and mobility increased land value and resulted in gentrification. For example, the Ecoville neighbourhood emerged in association to a major urban road (connector line 5), a project implemented in the 1970s to 80s. The neighbourhood, although initially planned as a hub for affordable housing, turned out an area of high land a housing prizes, given its location close to main communication infrastructures. Moreover, urbanization in Curitiba often happened through irregular occupation. According to municipal data, the number of houses in slum areas rose from 32,094 in 1996 to 55,460 in 2009. Over fifty thousand city residents are estimated to live in vulnerable areas in close proximity to rivers and streams.

BOX 2 - The Studio experience in Curitiba, ~~Technical Federal University of Paraná~~ (UTFPR), Brazil (Continued)

Biodiversity policies in Curitiba can be found in the City Plans, including three main ones: Urbanization Plan (*Plano de Urbanização de Curitiba- Plano Agache*), Preliminary Urbanism Plan (*Plano Preliminar de Urbanismo-Plano Serete*) and Master Plan (*Plano Diretor-2004*). Each of the Plans included guidelines related to biodiversity. *Plano Agache*, addresses biodiversity only partially, mainly through green areas and road arborization remodelling, mostly for embellishment and recreation purposes. *Plano Serete* also emphasized the role of green space for recreation, yet arborization was as well connected to flood control. The 2004 Plan offers a broader spectrum of environmental considerations, yet biodiversity continues to be addressed only partially. Besides City Plans, concerns about green space preservation has manifested in multiple local laws, decrees, and administrative practices and investments.

Municipal records show a significant increase in urban green space over the last decades: in 1974 there were 6,4m²/resident, while in 2012 the ratio reached to 64,5. This increase is related to higher number of parks, groves, plazas and preserved areas: in 1988 there were 5 parks and 5 groves in the city; nowadays there are 21 parks, 15 groves, 451 plazas, 2 preserved areas. Until recently, arborization focused on addressing health and aesthetic concerns, with species chosen according to their functionality and not because of biodiversity value. As a result non-native species were often chosen at the expenses of native ones. In recent years the use of native species has significantly increased, especially because of the prohibition on the use trees identified as invasive. Moreover, some tree species have been recognized as entities of historical, cultural and/or ecological value and have received legal protection.

The Studio included the following faculty members: Prof. Tatiana Maria Cecy Gadda (STUDIO coordinator); Prof. João Almeida de Góis; Prof. Maria José Soares de Mendonça de Góis; Prof. Maria Lucia Figueiredo Gomes de Meza; Prof. Patricia Précoma Pellanda; Prof. Sergio Tadeu Gonçalves Muniz; Prof. Sileide France Turan Salvador ; Prof. Tamara Simone van Kaick; and

Students in Curitiba Studio: Maiara Soares de Carvalho, Nilson Ramos de Mello Filho, Rafaela Graça Scheiffer, Gabriel Massao Fugii, Juliana Nami Fugii, Juliane Marise Barbosa Teixeira, Leticia Sayuri Kumegawa, Markos Flavio Bock Gau de Oliveira, Marta Chaves Vasconcelos, Ana Laura Botelho Rodrigues, Angelita Rolim de Moura, Gabriela Furtado China, Karoline Fischer, Letícia Costa de Oliveira Santos, Maria Rosângela dos Santos, Augusto Frederico Junqueira Schmidt, Pedro Loureiro Klein, Cristiane do Rocio Archanjo, Marcela Valles Lange, Raquel Hubie Busato, Daniel Marcelino da Silva and Arturo Vaine.

Partial contributions: Daniel Marcelino da Silva, Eduarda Guimarães de Almeida, Marina Rocha Telles, Ismair Ignácio Junior and Mayara Quadros de Andrade.



In Bhopal, India, the studio was conducted by the School of Planning and Architecture from May 17 through 31, 2012. Fifty students and twelve in-house faculty members participated. The studio comprised literature review, field surveys, discussions with informants, focus group discussion, and interviews with individuals and organizations (see Box 3).

In Yogyakarta, Indonesia, the studio was carried out by Gadjah Mada University's Department of Architecture and Planning master's degree program. It comprised 2 professors and 11 students from the Regional and Urban Planning Studies Program. Regular meetings were conducted twice a week (see Box 4).

The Lugo, Spain, studio included only two master students majoring in Sustainable Land Management at the University of Santiago De Compostela with support from the Land Laboratory research group. As part of thesis activities, one of the students focused on the analysis of environmental values with respect to conservation and nature protection, while the other student focused on the governance issues and the legal instruments available for decision-making (Box 5).

The Manila, Philippines, studio was conducted by the United Nations University Institute of Advanced Studies (UNU-IAS) in partnership with local organizations. The studio was designed as one of the modules in the Biodiversity Policy in Practice, which ran from January through July, 2012. The class included eight international students from considerably diverse academic backgrounds and experience. The case study area focused on the northern half of the Las Piñas Parañaque Critical Habitat and Ecotourism Area (LPPCHEA), called Freedom Island. In the Manila case, no participants were familiar with the site. Leading up to a ten-day fieldwork excursion to the project site, the class met an average of once weekly, and began earnest research roughly five weeks prior to the field excursion (Box 6).

For Bejaia, Algeria, the studio was operated by the University of Bejaia's Department of Biological Sciences of Environment. Class was held once a week with 20 master students enrolled. The students were divided into four groups to collect data including information within universities, information from institutes, and flora and fauna studies. Finally, a studio in the city of Belo Horizonte, comprising three instructors and a group of ten students also compiled an LBSAP (Box 7).

BOX 3 - The Studio experience in Bhopal, India, by School of Planning and Architecture – Bhopal

The studio in Bhopal, India was conducted by the School of Planning and Architecture in collaboration with the Madhya Pradesh State Biodiversity Board from 17 May 2012 to 31 May 2012. The studio, entitled “The LBSAP Global Studio 2012 – Bhopal,” engaged fifty students, twelve in-house faculty members, and several experts from Bhopal. Students were grouped into seven groups to work on: biodiversity assessment and identification; conservation status of species by ecosystems; priorities and targets for conservation and restoration; governance and legal framework, existing project; and implementation.

Based on the objectives proposed in the LBSAP Guidelines, the studio studied the biodiversity in Bhopal at both a city level and a sub-divided local level. Several actions were conducted to collect data, including literature review, field surveys, focus group, and interviewing individuals and organizations specialized in urban and biodiversity issues. An analytical matrix was applied to facilitate the identification of ecosystem types, states of conservation and threats in the study area, which provides insight into values and threats of ecological assets within the city. One of the achievements of the studio was to collect quantitative data whenever possible in order to conduct a CBI assessment (Table 1). Importantly, the studio noticed two problems while applying the CBI assessment. Firstly, the ecological data tends to be less available in built environments. Secondly, some indexes were not able to be fulfilled because of the lack of measureable information.

Table 1 The CBI assessment of Bhopal

S. No.	Indicator	Score
1	% of natural/semi-natural areas	4
2	Diversity of ecosystems	3
3	Fragmentation Measures	3
4	Native biodiversity in built-up areas	4
5	Number of native Plant species	3
6	Number of native Bird species	1
7	Number of native butterfly species	1
8	Number of native hard corals species	Not Applicable
9	Number of native species	Not Applicable
10	% of protected areas	1
11	Proportion of native species (as opposed to invasive alien species)	3
12	Freshwater Services	3
13	Carbon storage	3
14	Recreation and educational services Number of visits/person/year	1
15	Recreation and educational services Area of parks and protected areas/population of city	2
16	Recreation and educational services No. of educational visits to parks or nature reserves per year	4
17	Budget allocated to biodiversity projects	1
18	Number of biodiversity projects and programmes organised by the city annually	1
19	Rules, Regulations & Policy	2
20	No. of institutions	2
21	No. of inter-agency co-ordination initiatives	4
22	Participation & Partnership Existence of a consultation process	3
23	Participation & Partnership Existence of partnerships	4
24	Education & Awareness-raising Incorporation of biodiversity into the school curriculum	4
25	Education & Awareness-raising No. of outreach programmes/ public awareness events	1
	Total	58

BOX 3 - The Studio experience in Bhopal, India, by School of Planning and Architecture – Bhopal (Continued)

The studio successfully built a partnership between the School of Planning and Architecture and the Madhya Pradesh State Biodiversity Board. The Bhopal studio not only achieved the target of proposing an LBSAP, but also raised biodiversity awareness at multiple levels. The fact that delivering an LBSAP requires substantial authentic data—such as legal frameworks, land use maps, biotope maps, and biological inventory—further drew the attention of local authorities to compile and to publish associated information. It is expected that the studio exercise will continuously catalyze the action of local governments.

The Studio included the following faculty members: Dr. Manmohan Kapshe; Dr. Kshama Puntambekar; Amit Chatterjee; Vishakha Kawathekar; Gaurav Singh; Sonal Tiwari; Geeta Vishwakarma; Shweta Saxena; Prashant Khirwadkar; and Vinita Paikr

Students in Bhopal Studio: Aakanksha Jain; Shweta anand; Akash malviya; Rupali Rathore; Avani Dare; Rashmi Bhardwaj; Pradip Sharma; Lucy Kumari; Prakash Matho; Utkarsh; Hari raman; Kamal Peshwani; Nitin Singh; Liju Mathew; Nitish Kumar; Ruchi Karkare; Nongmathem Johnson Singh; Rajendra Singh; Pranjal Das; Alankrita Sarkar; Nisha Singh; Sushil Kumar; Shalini Brahma; Anish Goyal; Amit Kumar; Garima Gupta; Abha Singh; Skand Kumar; Riny Sharma; Deepank; Shailendra Kumar; Parikshit Nema; Neha Saxena; Siddhartha Singh; Arundhati; Saumya Jain; Ashwathi; Chiprkshi Kumar; Ahmed Musthafa; Shashi; Ankur Diwan; Akshay Taiwade; Vickyson; Abhinav Chunchu; Amit Dogra; Sahu.



4.3 Studio: problems and availability

For many participating universities, it was the first time for urban biodiversity concerns to be discussed in both the participating institutions and the location. Based on the results of the studios so far, the outcomes and feedback have provided useful information for the advancement of the studio practices and the further development of formal LBSAP guidelines. There are several points for critique of the LBSAP based on the studio exercise as discussed below.

a) Definition of biodiversity and ecosystem services

The LBSAP guideline intends to take into account the ecosystem services of the local conserved biodiversity. However, it seems that the explanation regarding what ecosystem services are and their associations with biodiversity failed to impress some guideline users. Participants tended to make a direct association with wildlife diversity but neglected the need of discussing ecosystem functioning. The wide spectrum that might be covered by ecosystem services also gave rise to concern on the need of cross-disciplinary studies (Box 4 - Yogyakarta).

Some strategies have been proposed by the studios to identify ecosystem types and associated services. Both the studio at Bhopal and Lugo adopted matrices to describe ecosystem types, ecosystem services, and associated threats. Although the classification scheme differed between studios and might need further discussion, it provided a simple and systematic way to initiate the identification of ecosystem services at a locality (See Box 3 and 5, Bhopal and Lugo). In general, studying local ecosystem services is challenging for the studios due to the complexity of ecosystem services, and familiarity of the participants with them. Additionally, there was sometimes a limitation of relevant information on ecosystem of a certain locality. As a result, the studio practices tend to focus more on specific wildlife taxonomy, such as trees and birds, rather than the overall functions of ecosystems and their services.

Box 4 - Studio in the Urban Agglomeration of Yogyakarta (UAY), Gadjah Mada University, Indonesia

This biodiversity studio took as scope the area in the Urban Agglomeration of Yogyakarta (UAY). UAY is the combined areas of Yogyakarta City and other suburban areas around the city. The reasons for selecting the observation area are that not only UAY is an area meeting the requirement as a city, but within it there are various habitats such as drainage, river, park, forest, and settlement.

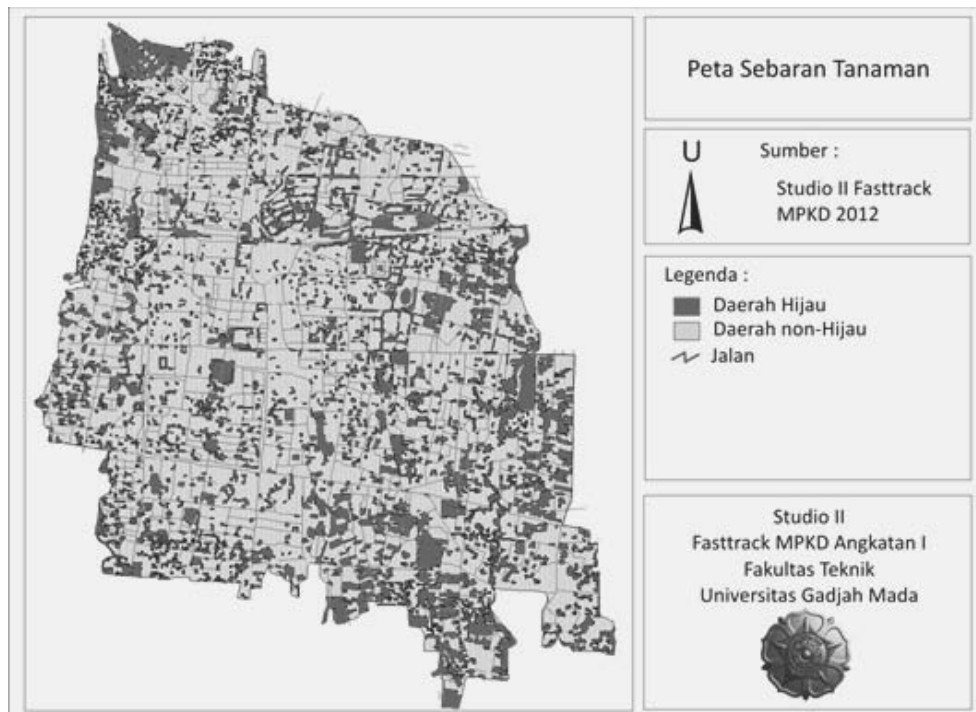
The studio was carried out by a group of two faculty and eleven students from various regions throughout Indonesia enrolled in the Study Program of Regional and Urban Planning, Department of Architecture and Planning, Gadjah Mada University, Indonesia. The method used in the Biodiversity Studio was a case study method, i.e. by emphasizing the object observed as 'case'. All the students were required to find out the most appropriate method for finding out the status of biodiversity in field in a direct manner, the ways the local policies protect it, and the relatedness with any policies at a national level. The group met twice a week with duration of six hours for each meeting during one semester. The data used in the studio were collected by a field survey technique and visiting the relevant organizations and also consultations with the faculty. Along the studio, the students in Master of Regional and Urban Planning become more interested in biodiversity and environment sciences, and they could bring this to their careers as planners.

Problems and difficulties encountered in the Biodiversity Studio were as follows: The limitations of scope were too compelling for analyzing some ecosystems in the view of administrative boundaries, as many ecosystems exceeded the administrative boundaries of Yogyakarta City. Most of the biodiversity analyzed were in the built area (anthropocentric). Moreover, the background of the group of students was relatively insufficient to understand the basic information on the biodiversity and ecosystem services. Finally, the framework in the LBSAP documents was still too general and there was no step-by-step assessment technique.

There are interesting efforts in community based gardens and reforestation efforts, but the city has limited spaces for biodiversity in natural ecosystems and little information on the topic. Some strategies the group developed are the replicability of existing efforts for improving biodiversity and reforestation in the city, working with neighboring municipalities to manage their biodiversity, whose ecosystem the city depends on. The city should also involve social organizations which helped in the reforestation initiatives and also in cultivation of local crops and medicine gardens. Adding value to the medicine gardens could also increase the interest by the local population in biodiversity. Moreover, a special system of land budgeting for land consolidation and connection among different plots of biodiversity and increase the awareness raising efforts in the city so the local population can understand the importance of biodiversity.

Box 4 - Studio in the Urban Agglomeration of Yogyakarta (UAY), Gadjah Mada University, Indonesia (Continued)

The studio was guided by professors Leksono Probo Subanu and Retno Widodo Dwi Pramono from the Department of Architecture and Planning, Gadjah Mada University with the participation of the following students: Andi M. Ahsan Mukhlis, Bagus Ramadhan, Dwita Widyaningsih, Emmy Yuniarti Rusadi, Gayatri Priamitra W., Hatta Efendi, Hendri L.J. Tanasale, Monica Sindy Heryuka, Muhammad Rezki H.R., Tetty Harahap and Warih Rahayu.



Box 4 - Studio in the Urban Agglomeration of Yogyakarta (UAY), Gajah Mada University, Indonesia (Continued)

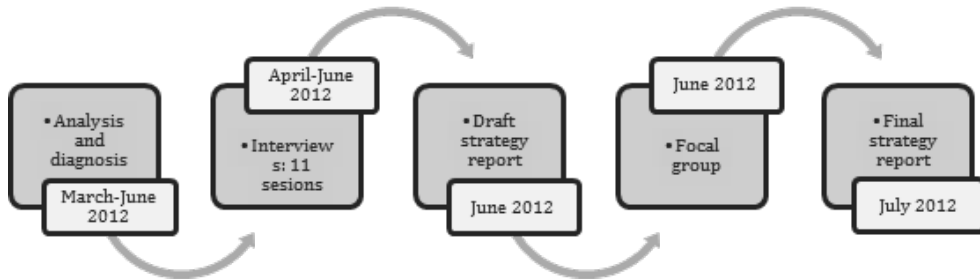


Biodiversity in the building environment in Yogyakarta, Indonesia

BOX 5 -The Studio experience in Lugo, University of Santiago de Compostela, Spain

The studio for the city of Lugo, Spain, was carried as part of the Master in Sustainable Land Management of the University of Santiago de Compostela and had the support of the Land Laboratory research group (<http://masterterra.usc.es/>). Two students wrote their master thesis based on the studio under the supervision and orientation of three professors of the group: one thesis analysed environmental values and biodiversity conservation, while the other one focused on governance mechanisms and decision-making process. Both primary data (interviews with local stakeholders) and secondary information (bibliographic and cartographic sources) were used in the studio, which included the identification of critical urban and periurban natural values, the role of urban and environmental planning and management, and the strategies to improve the conservation of local biodiversity.

BOX 5 -The Studio experience in Lugo, University of Santiago de Compostela, Spain (Continued)



The studio required a total of 490 hours of work including 3 months of data collection (180 hours), 22 hours of interviews, 60 hours for the elaboration of the draft report, a focus group of 8 hours and 120 hours for the final report. The studio benefited from the involvement of partner organizations including the Regional Government of Galicia province, the Municipality of Lugo, the regional NGO *Asociación para a Defensa Ecolóxica de Galiza* (ADEGA), the Colexio Oficial de Arquitectos de Galicia (COAG) and the Community forest of San Miguel de Orbazai.

Main findings

Lugo is a city founded in the early first millennium located in northwestern Spain. Today the city has around 100,000 residents in a flat area extending over 330 sq km temperate broadleaf and mixed forests biome including freshwater habitats. The urban area hosts about 550 species and subspecies—327 species of flora (including fungi) and 223 species of fauna. The main instruments for biodiversity protection include the UNESCO Biosphere Reserve of *Terras do Miño* and two nature reserves along the main river, to the northwest and southeast of the urban fringe. There are also priority species and priority natural habitats identified in the European Union Habitat Directive.



BOX 5 -The Studio experience in Lugo, University of Santiago de Compostela, Spain (Continued)

Small number of green areas and lack of large green spaces within the urban fabric, together with urban and infrastructure development over agricultural land and the presence of several invasive species (e.g. water fern *Azolla filiculoides* and trest swamp crayfish *Procambarus clarkii*) are the main threats to local nature. The local government has put in place regulatory measures and ~~implemented plans that environmental problems and green space management~~, including municipal ordinances on water discharge and green spaces; special plans for river bank renewal and conservation of remnant oak groves; a mobility and public space plan; urban land use and urban strategic plans.

The studio sought to elaborate a common vision for the local biodiversity in order to devise alternative scenarios for future implementation. The common vision is a town surrounded by a green belt with corridors to connect with the existing urban parks, and the utilization of native species in landscaping. The process consisted in a series of interviews with key stakeholders, in the analysis of available information, and followed by the assembling of a focus group to discuss and agree upon the proposed vision, strategies and actions.

The biodiversity strategies identified by the studio include environmental, social, economic, and governance (and legal) interventions. Environmental aspects include biodiversity conservation (especially of endemic and protected species) alongside sustainable use on natural resources (e.g. creation of local food systems, improvements in connectivity, and proper management of invasive species). Social considerations include awareness raising, capacity building and environmental innovation by higher education institutions. Economic issues comprise from reducing urbanization and infrastructure developments to the promotion of sustainable tourism. Last, governance and legal aspects emphasize the need to integrate existing plans and projects, increase public participation, promote town-wide agreements and improve coordination across governmental departments.

The Lugo studio was organized by Prof. Urbano Fra Paleo, Prof. Rafael Crecente Maseda, Prof. Andrés García and had two students – Laura García Alonso and Patricia Sánchez Pedreira.



BOX 6 - The Manila Studio Experience, United Nations University Institute of Advanced Studies (UNU-IAS), Japan

The Las Piñas Parañaque Critical Habitat and Ecotourism Area (LPPCHEA), located in southern Manila, Philippines, served as the object of study for the UNU-IAS (Yokohama, Japan) MSc. course “Biodiversity Policy in Practice”. Conceived as a practical module of the core curriculum, researching and compiling the LPPCHEA LBSAP was the culminating activity of the course. Participants comprised students representing seven nationalities and as many disciplines, and two faculty members specializing in biodiversity governance. LPPCHEA currently provides a critical habitat for biodiversity, both of local and migratory origin, such as the endangered Philippine Duck and the Chinese Egret.

The study was performed in order to draft a LBSAP for LPPCHEA’s Freedom Island to help ensure that the critical habitat can be maintained in the future. With direction from the LBSAP Guidelines, the status of Freedom Island was assessed, taking into consideration not just the environmental but also the socio-economic and political contexts as well. The aim of this strategy and action plan is to respond to the Philippines’ National Biodiversity Strategy and Action Plan, which in turn responds to internationally agreed targets – the Aichi Targets of the Convention on Biological Diversity (CBD).

Leading up to a ten-day fieldwork excursion to the project site, the class met an average of once weekly, beginning earnest planning of the research roughly five weeks prior to the field excursion. Two guest speakers—arranged by the faculty—came to share personal expertise with the students on two separate occasions. One in-house expert in GIS led two class sessions in GIS and habitat fragmentation immediately prior to the field excursion. Student participants were tasked with individually researching one of eight interlinked thematic areas: ecological data and background of the site; the management of LPPCHEA; the law, regulatory and policy issues that influence LPPCHEA and LBSAP; the socio-economic aspects, and ecosystem services (TEEB); urbanization, urban development policies; stakeholders and BSAP coordination; physical analysis; and, education. Prior to the fieldwork students were required to present pre-fieldwork research for their specific topic, as well as a research plan for the duration of time spent in the Philippines. During the ten-day fieldwork excursion, the students managed to conduct at least 36 interviews with nearly as many stakeholder groups, as well as host a World Café for the purpose of transparently generating strategies in five critical action areas identified by fieldwork: assurance of ecosystem health, assurance of democratic representation of stakeholders, development as an ecotourism site, improvement of access, and development of CEPA initiatives.

BOX 6 - The Manila Studio Experience, United Nations University Institute of Advanced Studies (UNU-IAS), Japan (Continued)

The studio successfully engaged a number of stakeholders while maintaining an objective approach and receiving important contributions from all involved. The strategies and action plans generated by the studio's efforts are a starting point for further work in defining a robust and implementable LBSAP for LPPCHEA. In terms of the LBSAP process so far, the following observations have been made that may also help with future LBSAP work in Manila and elsewhere:

- The main issues were more social and economic rather than environmental.
- In general all interviewees were willing to answer all questions.
- Key documents and spatial data were missing or withheld (environmental impact assessments, comprehensive land use plans, ten-year city plans and zoning, test results on water quality and microbenthics).
- Key interviews (Metro Manila Development Authority, Department of Education, Land Management Bureau) were not possible due to time constraints.
- The purpose of the Study was misunderstood by some stakeholders (e.g. to fix the problem of informal settlers on the edge of the lagoon), but clarified during interviews.
- Many stakeholders had high/incorrect expectations of Study, and underestimated their role in the process (hoping for a magic solution).
- Some stakeholders gave what were perceived as political responses, reflecting the apparently highly political nature of Freedom Island's current situation.

=====

BOX 6 - The Manila Studio Experience, United Nations University Institute of Advanced Studies (UNU-IAS), Japan (Continued)

The studio was led by the following faculty members: Dr. Jose Puppim de Oliveira and Dr. Volker Mauerhofer, with assistance from Dr. Christopher Doll. The following students participated: Adeniran Akanni, Adele Phillips, Bidur Khadka, Dinesh Joshi Ratala, Julia Hunter-Anderson, Kasundika Bandara, Mpha Ma rtha Kalemba, Ndi Richard.



Students in the field



Students discussing the LBSAP in Manila

BOX 7 - Studio in the City of Béjaïa, University of Béjaïa, Algeria

The studio was organized by the Department of Biological Sciences of Environment, Faculty of Nature Sciences and Life, University of Béjaïa, Algeria. Twenty students and four faculty members of the Master's Programme in Natural Sciences of the Environment took part in the studio in weekly meetings totalling 40 hours in the classroom, but also included many fieldtrips organized for the study of plants, wildlife and to collect information from institutions. The instructors divided the students into four groups to collect information and for the thematic fieldtrips in the following topics: Information in the university, information among institutions, study of the flora and study of the fauna.

The studio scope was the city and department of Bejaia (12,022 hectares), located in the north-central Algeria 181 km east of the capital Algiers on the south shore of the Mediterranean. This is a very old city that has seen many cultural inputs from several people across the Mediterranean region. The city is crossed by three rivers and is bordered to the east by the River Soummam Ramsar Site and is located at the bottom of the Mountain Gouraya that has a status of National Park and Biosphere Reserve.

The various studies of the flora have identified 119 plant species on the territory of the city of Bejaia. Some have a proprietary interest as *Rosmarinus officinalis* with regional presence throughout the Mediterranean. Most of the wildlife in the city of Bejaia is found in urban park Lake Mezaia which is urban wetlands with many species of birds. However, even though biodiversity in the city is rich, there is no synthesis to catalogue all biodiversity so far. The most detailed inventories are mainly birds.

The ecosystems provide a series of services to the population, including recreation, water and the famous candles. Known in Roman times under the name *Saldae*, in the middle Ages, the city became known for the quality of its candles made of beeswax to which it gave its name in French (*Bougie*). Candle has played a role in the spread of Arabic numerals in the West.

Unfortunately, due to population growth, even natural areas within the city have been swallowed up by rapid urbanization. Current problems that threaten biodiversity are related to the expansion of the city and its urban sprawl. In addition, the port of Bejaia has been a factor in the development of transport mostly by truck, which increases air pollution. The lack of rain for more than six months causes drying of small rivers that cross the city and endangers the lives of plants and animals, as well as the population.

There are many policies, laws and actions taken by the locality to improve biodiversity within and beyond the administrative boundaries, but the enforcement needed to be improved. The city also has limited information about the local biodiversity, which makes planning even more difficult. The studio came up with suggestions of several strategies and actions, including the provision of a green belt of the city of Bejaia with large tracts of natural areas, creation of water reservoirs upstream to allow the smooth flow of rivers crossing the city, a better enforcement of laws, multiplication of actions in training, research and awareness for the protection of natural spaces and the city and the creation of a responsible post for biodiversity in the city council.

BOX 7 - Studio in the City of Béjaïa, University of Béjaïa, Algeria (Continued)

Studio partners in the city are the Environmental Services, Forest Conservation and Services of green areas in the city of Bejaia. The municipality will try to develop a national network and join the Mediterranean network of cities for biodiversity. The learning process enabled the students to know the concepts of stages in a project, all the concepts related to biodiversity, to realize that in the cities there are also rich in biodiversity. Moreover, the faculty found the studio a very useful exercise to teach students to contact local institutions, asking after information and explain the objectives of the studio, making local officials aware of the importance of biodiversity planning locally.

=====

Teaching Staff of the Department of Biological Sciences of Environment: Professor Aïssa MOALI (coordinator of the studio), Dr Farid BEKDOUCHE, Dr Mourad AHMIM, Dr Abdelhak DAHMANA. Students in the studio were Zahra AIT MOUHOU, Yasmina BAZIZ, Idir BENSALAM, Kahina CHENNI, Karim CHITER, Khalssa DJEDDI, Lidia HASSANI, Yasmina MAGHLOUCHE, Hanane MERSEL, Mustapha MOUSSAOUI, Wahiba MOUSSAOUI, Zahia NANECHÉ, Yasmine OUAKKOUCHE, Yasmina OUARMIM, Lilia SADAOU, Yasmina SADELLI, Amine SAIDI, Souad TEBACHE, Anissa TEBBACHE and Leila TOUCHANE.



View of Bajaia from Mezaia Wetland and Mount Gouraya in the back



Students and faculty during the studio discussions in Bejaia

b) Conservation objects in harsh environments

For many studios, the first step of developing an LBSAP is to determine ecological valuable areas for conservation. However, ecological characteristics vary due to the location of cities. Some regions may tend to contain wildlife which is easily recognized, whilst some may not. The studio exercise operating in different ecological regions allowed us to observe challenges regarding decision making of conservation objects among different regions. The studio in Yerevan, located in a semi-desert environment, raised an interesting question (See Box 1). The studio encountered challenges regarding determining what to conserve in such a naturally harsh environment, where little is considered to be ecologically valuable. In order for the studio to proceed, it decided to narrow down the study scope to four “biodiversity hotspots”. In practice, this action enabled the studio to deliver a focused discussion and to draw a site-specific solution. However, the discussion separated conservation areas from the rest of the city, potentially neglecting the important link between cities and the underlying natural environments. Obviously, there is still a need for more discussion about conservation objects for cities located in harsh environments.

c) The application of Cities and Biodiversity Index (CBI)

Incorporating the City Biodiversity Index (CBI) is one of the required exercises for studios, but most of the studios failed to fulfil this requirement. Only the Bhopal studio managed to conduct a CBI assessment. According to the participants, it was difficult to apply a biodiversity assessment with CBI because of the limitation of available data. Firstly, the CBI assessment requires quantitative biological information, which necessitates authentic ecological surveys conducted in advance. For many countries, ecological conservation in cities is of less concern, and therefore data for such a city-wide assessment is not available. Moreover, any assessments can cost significant amount of resources, which are unavailable for most of the cities, particularly in developing countries. Secondly, the typical studios like those in this report do not have enough time to collect all the information needed for the CBI, and sometimes neither have the expertise to carry out such task. Finally, much information might exist in a descriptive form instead of a quantifiable nature, which makes CBI less applicable for cities that have not yet established a quantitative dataset. Positively, although some of the indicators were not applicable in Bhopal, the exercise of the studio has raised the awareness of associated authorities regarding the importance of publishing ecological records of management targets, implementation processes and existing outcomes.

d) The cultural and historical value of exotic species

Urban landscaping often pays attention to providing amenity environments for people and tends to introduce ornamental plants or even crops for local agriculture. These introduced plants are generally regarded as negative to native ecosystems in the ecological perspective. However, some of these plants persist in the city for a long time and may be associated with some historically significant places. The studio in Curitiba studied street trees and unveiled the fact that many exotic trees are part of the historical landscape or heritages in the city for long time, which tend to be culturally valuable or historically meaningful to the locality. In this regard, it is not appropriate to remove them without taking cultural and historical value into account. Yet, there are no conclusive outcomes proposed by the studio, leaving room for future discussion.

e) Capability to initiate public-private partnership

Through the studio exercise, one of the important achievements is the emergence of public-private partnership between studio universities, NGOs and local governments. Some studios invited officials from local authorities and experts from NGOs for lecturing in the studio and for participating in discussions; and some studios conducted focus group meeting or interviews with key persons from public sectors. These activities created a favourable environment facilitating conversation between governments and universities. Studio participants benefited from having direct information from government, and the outcome from the studio might be used to inform decision making in the future.

For example, the studio in Curitiba invited officials from the Municipal Agency for the Environment to give lectures. Involvement of local officials in studio discussions opened up an opportunity for studio participants to clarify doubts and to receive feedback directly from the government perspective. An invited lecture from LIFE Institutes, which is an organization developing a certification for granting public and private institutes that act for biodiversity conservation, also brought potential for closer cooperation (Curitiba, 2012). On the contrary, the disconnection between local authorities and NGOs discouraged participants in the Yerevan studio, because the studio exercise seems to have resulted in little influence to the future decision making on urban biodiversity and ecosystem services (AUA, 2012).

f) Observed barriers to biodiversity and ecosystem management

There are also problems reported by the participants that might undermine the delivery of local biodiversity strategies and actions. These problems are associated with barriers in institutional, technical, and financial areas. For each area, this report summarizes the main concerns as follows:

Institutional barriers

The lack of coordination among several entities working on biodiversity and local planning at the different levels is one of the main challenges to incorporate biodiversity in decision making process at the local level. The LBSAP process can contribute to help this coordination. The Manila case illustrated how institutional barriers could serve as both an impediment to ecosystem conservation, stakeholder engagement, and the research activities of the studio participants. There were a lot of interesting initiatives among the different stakeholders and, indeed, the condition of the wetland has improved in the last few years (LPPCHEA, Manila, see Box 6). However, the whole efforts are threatened by waste and water pollution and a large project to reclaim the area for urban development. The decisions over those issues were under an entity within one ministry but other organizations diverge on the directions of the project.

Technical barriers

A great deal of information is needed for the discussion of biodiversity and ecosystem services. Biodiversity in cities has traditionally been overlooked; therefore cities generally lack a database systematically compiling associated information in one place. Also very often, any existing data is separated in different sources and not compatible. It is

reported that access to important data was hindered by the lack of transparency of public administrations, and the lack of a comprehensive and detailed analysis at the scale of the town. As the result, data collection was time-consuming, such as in Lugo and Bhopal.

There might be also differences in technical capacity between cities. For many cities, green spaces that are potentially important areas for biodiversity and ecosystem functioning can be identified from the land use map. However, the studio in Yerevan reported that such information is missing from the city (Box 1). Cities that utilize different planning systems and development conditions might interpret land information in various natures. As such, some planning systems might provide more information to meet the need of conservation planning and management, while others might not.

Another technical barrier lies in information sharing and knowledge transfer. It is very common that some experts hold expertise of local environments, and such knowledge was not able to be shared or translated into a communicable form for people from different professionals. In Manila's case, although various technical committees are formed under the technical working group with a number of specialists, these specialists were not able to transfer knowledge and know-how of management techniques to the people at the local level so far (Box 6).

Financial barriers

Although budget arrangements are little discussed by the studios, it is recognized that budget shortage is one of the potential barriers that would undermine the implementation of an LBSAP in many cities. The Manila studio report points out that existing problems—such as solid waste management—will require a large budget in order to improve the conditions. However, there have so far been no clear financial plans indicating budget sources and associated conditions.

5. Lessons learned from the studio

It is generally appreciated that the studio raises the awareness of urban biodiversity issues among students and sometimes within the associated local authorities. Although there were operative and environmental differences between studied areas, by unfolding such differences it is possible to examine problems in more depth and gain lessons from a broader context.

5.1 Lessons learned to improve studio exercises

It is observed that students from the background different from ecological associated departments tend to face more difficulties from the outset, as they have never received associated information in this regard. Studios with instructors and students from multiple backgrounds experienced sufficient discussions of biodiversity contents and were able to overcome individual professional barriers to share information across the disciplines (e.g. Curitiba, Box 2). As emphasized in both the Studio Guidelines, determining local biodiversity strategies requires an interdisciplinary discussion and cooperation. Studios that involve mix-background participants (either students or instructors) tend to have a better chance of understanding biodiversity content from different dimensions at the studied areas. On the contrary, studios engaging participants from the same professional, particularly from disciplines that have traditionally less associations with ecological systems, such as architecture and urban design, were less likely to show sufficient discussions and understanding of local biodiversity.

In addition, familiarity with the case study area is important for the short-term studio to get more insight. In Manila, the lack of familiarity with the culture and location severely limited the overall autonomy of the student researcher team (Box 6). The intense and brief on-location time frame meant that emphasis needed to be placed on information gathering, leaving little time for synthesizing the data collected, and conducting follow-up inquiries.

Finally, language barriers were less addressed but might be a fundamental problem that hinders studio exercises and performance. The studio guideline and the references associated with LBSAPs were written in English, which could restrict the participation and the understanding of non-native speakers. Language requirements requested in some studio ~~is expected to limit the participation opportunities of some local students~~ (e.g. Curitiba, Box 2). The request of final report in English gives rise to concerns on translating quality. Important information might be missing or misinterpreted in the process of translation.

5.2 Lessons learned to build LBSAP guidelines

To some extent, studios operating in different countries are epitomes reflecting problems that might also be encountered by local authorities. The studio testing part of the LBSAP guidelines provides a platform by which to observe potential problems in the guidelines, providing valuable feedback that would contribute the refinement of the LBSAP guidelines. Suggestions from the studios to enrich the LBSAP guidelines can be summarise into:

- 1) Clearer definition of the terminology and the scope of local biodiversity and ecosystem services;
- 2) Provision of more illustrations, photos, and tables to facilitate understanding and to attract users;
- 3) Provision of basic theoretical explanations;

- 4) Provision of assessment tools and standards; and
- 5) The need to discuss social and cultural values, and how to deal with them.

The term of 'LBSAP', which highlights biodiversity but not ecosystem services, is to some extent misleading. Because biodiversity conventionally connotes only wildlife and ecosystem services are less understood, participants who were not prepared to read the LBSAP document in its entirety might maintain the stereotypical understanding of biodiversity conservation. The narrow definition used in several studios suggests that there might be a need of a more explicit title and description to impress users with what ecosystem services are.

It is a generally reported barrier that the LBSAP guidelines were not specific enough to provide useful step-by-step information (Box 4, Yogyakarta). On the one hand, providing general guidelines covering a broad gradient and leaving room for self-interpretation by each locality allows the development of an LBSAP which reflects specific local contexts. However, on the other hand, the generality tends to undermine the document's utility due to the lack of a clear scope for participants to initiate an action and to determine the depth of discussion. The Curitiba studio noted that they were not able to answer the first question in the guideline: *What are characteristics of your ecosystems and their services in the locality*, because the answer might cover too many issues and may go to any level of detail. LBSAP guidelines need to present an explicit procedure with tools for local biodiversity evaluation, the fact of which might give rise to further problems for beginners.

General LBSAP guidelines have to provide guidance to both experienced environmental professionals and beginners in order to initiate conservation strategies in a locality. This gives rise to problems of what to include in the guideline. For a locality already experienced in biodiversity associated action, a general set of guidelines might not be able to provide useful information to advance local actions; whilst for beginners, introducing basic theory, assessment tools, and examples could be essential. It is not likely that one set of LBSAP guidelines could fulfil the needs of cities that are at different conservation levels and therefore some differentiation in the contents by levels might need to be addressed.

Furthermore, many introduced species, particularly plants, have become part of the townscape and might carry specific cultural and historical meanings. Although from the biodiversity perspective, the introduced species might be negative to overall ecosystems, they might be significant to the collective memory of citizens. In practice, such concerns might generate a dilemma in urban biodiversity conservation, whilst this issue has so far been neglect by the LBSAP guideline. Unfortunately scholar knowledge on the connections between biodiversity and ecosystem services is not clarifying enough, especially for cities. More discussion to address potential solutions should be included in the future guidelines.

6. Conclusions

Many challenges lie ahead for the successful integration of biodiversity into local planning processes. Biodiversity is still a foreign concept to many planning scholars and professionals. Very few planning schools around the world include aspects of biodiversity planning in their curricula, and planning tools are still under development, such as the CBI and the TEEB. Moreover, the task of developing comprehensive guidelines to instruct the creation of LBSAPs faces several conceptual and practical challenges. These factors pose tremendous obstacles to the implementation of Decision X/22. The process of learning by doing is important in order to develop concepts and tools, particularly for something that is little developed in literature.

Thus, these studios were one of the first attempts to develop LBSAPs in a comprehensive manner in different parts of the world. Even though the studios have their own limitations—timeframe, scope, resources and access to data—they provided important insight by which to create general guidelines for LBSAPs, and to identify the main obstacles to integrating biodiversity in local planning. The next steps are to continue to run more studios around the world, in order to gain experience and create a learning process with instructors and students, as well as to develop more comprehensive LBSAP guidelines for moving forward CBD implementation at the local level. There is a long way to go before realizing biodiversity as an integrated part of the local planning processes, but we can facilitate this process by developing tools and generating learning among the new generation of future planners.

References

- Bolund, P., Hunhammar, S., 1999. Ecosystem services in urban areas. *Ecological Economics* 29, 293-301.
- Bradley, C.A., 2006. Urbanisation and the ecology of wildlife diseases. *Ecology and Evolution*, 22(2), 95-102.
- Davis, D.S., 2000. *The consumer revolution in Urban China*. Berkeley: University of California Press.
- Elmqvist, I., Folke, C., Nyström, M., Peterson, G., Bengtsson, J., Walker, B., Norberg, J., 2003. Response Diversity, Ecosystem Change, and Resilience. *Frontiers in Ecology and the Environment* 1(9), 488-494.
- Foley, J.A., 2005, Global Consequences of Land Use, *Science* 309(5734), 570 – 574.
- Folke, C., Jansson, A., Larsson, J., Costanza, R., 1997. Ecosystem appropriation by cities. *AMBIO* 26, 167-172.
- Landsberg, H. E., 1981. *The Urban Climate*. Academic Press, New York.
- MA, 2005. *Millennium Ecosystems Assessment, Ecosystems and human wellbeing: current state and trends assessment*. Island Press, Washington DC. Available at: <http://www.millenniumassessment.org/en/Condition.aspx> [accessed: 26 June 2010].
- McKinney, M., 2002. Urbanisation, biodiversity and conservation. *BioScience* 52, 883-890.
- Niemela, J., 1999. Ecology and urban planning. *Biodiversity and Conservation* 8, 119-131.
- Pearson, C., Pilgrim, S., Pretty, J., 2010. (Eds.). *Urban Agriculture: Diverse Activities and Benefits for City Society*. Earthscan Ltd., London.
- Puppim de Oliveira, J.A.; Balaban, O.; Doll, C.N.H.; Moreno-Penaranda, R.; Gasparatos, A.; Iossifova, D.; Suwa, A., 2011. Cities, Biodiversity and Governance: Perspectives and Governance Challenges for the Convention on Biological Diversity at the City Level. *Biological Conservation*, 144(5), p.1302-1313.
- Puppim de Oliveira, J.A., Suwa, A., Balaban, O., Doll, C.N.H., Jiang, P., Dreyfus, M., Moreno-Peñaranda, R., Dirgahayani, P. and Kennedy, E., 2012. Good governance in cities for promoting a greener economy In Jose Antonio Puppim de Oliveira (ed.): *Green economy and good governance for sustainable development: Opportunities, promises and concerns*. Tokyo: United Nations University Press.
- Säumel, I., Kowarik, I., 2010. Urban rivers as dispersal corridors for primarily wind-dispersed invasive tree species. *Landscape and Urban Planning* 94, 244-249.
- SCBD-Secretariat of the Convention on Biological Diversity (SCBD), 2011. NBSAP training modules version 2.1 – Module 3. Mainstreaming biodiversity into national sectoral and crosssectoral strategies, policies, plans and programs. Montreal, June 2011. <http://www.cbd.int>

SCBD, 2010. Convention on Biological Diversity, Cities and Biodiversity Newsletter. 1(1).

SCBD - Convention on Biological Diversity, 2007. Cities and biodiversity: engaging local authorities in the implementation of the convention on biological diversity. Available at: <http://www.cbd.int/doc/meetings/cop/cop-09/information/cop-09-inf-10-en.doc> [accessed: 26 June 2010].

Shochat, E., Warren, P.S., Faeth, S.H., McIntyre, N.E., Hope, D., 2005. From patterns to emerging processes in mechanistic urban ecology. *Ecology and Evolution* 21(4), 186-191.

Snep, R.P.H., Opdam, P.F.M., Baveco, J.M., WallisDeVries, M.F., Timmermans, W., Kwak, R.G.M., Kuypers, V., 2006. How peri-urban areas can strengthen animal populations within cities: A modeling approach. *Biological Conservation* 127(3), 345-355.

Sontag, M.S., Bubolz, M.M., 1996. Families on small farms: case studies in human ecology. East Lansing: Michigan State University Press.

Sukopp, H., 2004. Human-caused impact on preserved vegetation, *Landscape and Urban Planning* 68, 347-355.

The Economics of Ecosystems and Biodiversity (TEEB), 2010. Mainstreaming the economics of nature: a synthesis of the approach, conclusions and recommendations of TEEB. [online] Available at: <http://www.teebweb.org/Portals/25/TEEB%20Synthesis/TEEB_SynthReport_09_2010_online.pdf> [Accessed 20 February 2011].

Tickle, A., Fergusson, M., Drucker, G., 1995. Acid rain and nature conservation: a preliminary study of protected areas at risk from acidification. World Wildlife Fund International, Gland.

United Nations, Department of Economic and Social Affairs (UNDESA), 2009. World urbanization prospects: The 2009 revision. [online] Available at: <<http://esa.un.org/unpd/wup/index.htm>> [Accessed 20 February 2012].

Whitford, V., Ennos, A.R., Handley, J.F., 2001, City form and natural process-indicators for the ecological performance of urban areas and their application to Merseyside, UK. *Landscape and Urban Planning* 57, 91-103.

Zerbe, S., Maurer, U., Schmitz, S., Sukopp, H., 2003. Biodiversity in Berlin and its potential for nature conservation, *Landscape and Urban Planning* 62, 139-148.

Annex 1 - The Aichi Targets

Strategic Plan for Biodiversity 2011-2020 and the Aichi Targets

Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society

- **Target 1** By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.
- **Target 2** By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.
- **Target 3** By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.
- **Target 4** By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.

Strategic Goal B: Reduce the direct pressures on biodiversity and promote sustainable use

- **Target 5** By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.
- **Target 6** By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.
- **Target 7** By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.
- **Target 8** By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.
- **Target 9** By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.
- **Target 10** By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.

Strategic Goal C: To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity

- **Target 11** By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.
- **Target 12** By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.
- **Target 13** By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.

Strategic Goal D: Enhance the benefits to all from biodiversity and ecosystem services

- **Target 14** By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.
- **Target 15** By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.
- **Target 16** By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation.

Strategic Goal E: Enhance implementation through participatory planning, knowledge management and capacity building

- **Target 17** By 2015 each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.
- **Target 18** By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.
- **Target 19** By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.

- **Target 20** By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011-2020 from all sources, and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization, should increase substantially from the current levels. This target will be subject to changes contingent to resource needs assessments to be developed and reported by Parties.

Annex 2- Studio General Guidelines for Testing LBSAPs (Local Biodiversity Strategies and Action Plan)

Background

In 2010, the 193 Parties (192 national governments and the European Union) who are signatories to the Convention on Biological Diversity (CBD) adopted Decision X/22 at the tenth meeting of the CBD Conference of the Parties in Aichi/Nagoya, Japan. Adoption of the Decision also meant endorsement of a “*Plan of Action on Sub-National Governments, Cities and other Local Authorities for Biodiversity (2010-2020)*”. Local Biodiversity Strategies and Action Plans (LBSAPs) are a mechanism for implementing the CBD and Aichi Biodiversity Targets at the local level, through alignment with National Biodiversity Strategies and Action Plans (NBSAPs).

In order to implement the Plan of Action, ICLEI-Local Governments for Sustainability, United Nations University Institute of Advanced Studies (UNU-IAS) and the Secretariat of the CBD (SCBD) are developing practical guidelines for local governments and cities to compile their LBSAPs and integrated biodiversity plans. This practical, “how to” guide complements previous publications by UNU-IAS¹ and the SCBD, which aim primarily to explain the concept of decentralized implementation and its importance, placing strong emphasis on alignment with national (and sub-national, where they exist) BSAPs, and provide local governments with step-by-step information for organisational planning, the construction and content of the strategies and action plan, and pragmatic solutions for mainstreaming and implementing the LBSAP. This city-biodiversity studio is an important mechanism to develop conceptual and practical approaches to better integrate biodiversity into the local planning process.

Studio Guidelines

The studio is an exercise to develop the LBSAP simulating real city situations. Based on the LBSAP guidelines, the studios work through the LBSAP guidelines to: draft a local-specific LBSAP and to make constructive suggestions for improving the LBSAP guidelines.. The following guidance can help potential participants to organise a studio for this purpose.

1. Aims of the Studio Exercise:

- 1) To carry out an exercise of developing a Local Biodiversity Strategies and Action Plan (LBSAP) for a specific local context based on the guidance in the LBSAP guideline.
- 2) To develop conceptual and practical approaches to better integrate biodiversity into the local planning process

2. Number of the Studio Participants

The number of student participants may be varied according to university courses, however, a minimum number of 10 students is recommended for a more efficient exercise.

¹ Pisupati, Balakrishna et al. 2007. Effective Implementation of NBSAPs: Using a Decentralized Approach. UNU-IAS <http://www.ias.unu.edu/resource_centre/Effective%20Implementation%20of%20NBSAPs%20-%20Pisupati.pdf >

3. Required Time for Exercise

The studio will be operated in five parts. We suggest that each part includes a series of lectures and the necessary field work. However, each university can adjust the timeframe to its own schedule. For a more detailed timeframe and required outcomes, please check the “Suggested Timeframe and Expected Outcomes” table below.

4. Case Selection

The case study can be any cities/localities or part of cities, depending of the scope of the studio. It could also include rural areas adjacent to the city or the administrative boundaries of a local government. The city, where the studio is located, should be given the priority as the case-study area. However, the case-study city may be changed by the studio organizers and teaching staff if the home-city provides too little in terms of data and progress on issues related to biodiversity.

5. Organizers and Teaching Staff

Studio exercises should be carried out under the supervision and guidance of a group of experts so as to ensure multi- and inter-disciplinary knowledge and teaching environment throughout the entire process. Ideally, the teaching staff should include experts from a range of disciplines and backgrounds, such as biology, ecology, geology, urban planning, architecture and landscape architecture. Not only academics should team up to carry out the studio exercise. The teaching staff should also include experts from governmental and non-governmental agencies who possess expertise and knowledge on local flora, fauna, conservation, ecosystems and land use aspects of the case study area.

6. Key Processes of the Studio Exercise

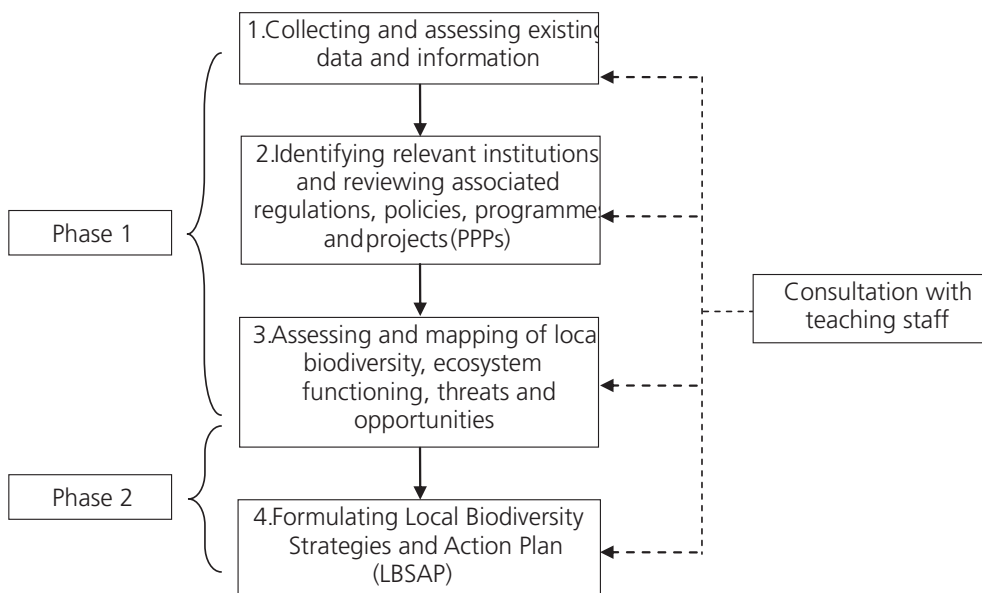
The four key steps in the studio exercise to develop the LBSAP are outlined below, and illustrated in the following flow chart. For further information regarding specific contents and tools within each step, please refer to Section III in the attached LBSAP guidelines.

Step One: Collection and assessment of the existing data and information on biodiversity in the case study area.

Step Two: Identification of relevant institutions and review of the associated governmental documents including laws, regulations, policies and programmes concerning biodiversity preservation in the case study area.

Step Three: Assessment and mapping of local biodiversity and ecosystem functioning, as well as threats and opportunities.

Step Four: Formulation of the Local Biodiversity Strategies and Action Plan (LBSAP) for the case-study city.



Suggested Timeframe and Expected Outcomes

The exercise should be completed in five parts. However, each group/university can adapt the suggested timeframe according to the university's academic calendar or availability of time for the studio.

Part (estimated time required)	Missions
Part 1 (~35h)	Conducting Phase 1
Part 2 (~8h)	<i>Presentation of initial outcomes from Phase 1 (presentation 1)</i>
Part 3 (~30h)	Conducting Phase 2
Part 4 (~8h)	<i>Presentation and reporting of final outcomes from Phase 1&2 (presentation 2)</i>
Part 5 (~8h)	Finalisation of the LBSAP report and feedback report to be submitted to UNU-IAS

Part 1 (Phase 1): Studios are expected to finish data collection and initial analysis specified in the first three steps. During the first phase, the studio participant should establish the analytical background for the LBSAP by collecting, reviewing and analysing the existing data available via secondary sources. However, a site survey may be required if the critical ecological information is missing from secondary sources. Initial mapping and assessment of ecosystems and their functioning, services, and values should be completed at this phase. Furthermore, the existing threats to local ecosystems and biodiversity as well as opportunities to preserve and enhance them need to be found out as part of the analytical studies. GIS-based software, if possible, may be utilized in order to assist with the spatial analyses and visualization of the results.

Part 2 (presentation 1): This Step should be devoted to preparing the outcomes of the analytical studies and presenting them to local experts and other colleagues. A group presentation via PowerPoint or other means is suggested. The objective of the

presentations is to provide the studio participants with comments and feedback on their work.

Part 3 (Phase 2): In the second phase of the studio exercise, the Local Biodiversity Strategies and Action Plan of the case study area will be developed. During this phase, the studio participants are expected to carry out further assessments to determine the actions and strategies for development and conservation which are of greatest priority, as well as to determine the instruments required to implement the actions and strategies. During this phase, the studio organizers can simulate participatory processes or role playing with the participants in the studio.

Part 4 (presentation 2): This Step should be devoted to preparing the outcomes of the second phase, the LBSAP, and presenting them to local experts and colleagues in other departments or universities. A written report should also be compiled and submitted before the presentations. The report should include the following aspects: ecological, social, and institutional background of the case study area; ecosystem assessments and mappings; and, strategies and actions for conservation. The objectives of the presentations is to provide studio participants with comments and feedback on their work.

There is no fixed format for the LBSAP report, which should be adapted to each case and studio. We can suggest the report contains the following parts,

- **Part A: Introduction and goals** - provides an introduction to the plan that includes a clear statement of conservation vision (aims and objectives), an explanation of the report structure and process to reach the outcomes of the LBSAP.
- **Part B: Institutional structure, legislations, policies and plans** - outlines policy framework, institutional structure and individual mandates which are associated with biodiversity protect, utilize and manage in the different departments and governments.
- **Part C: Condition of urban biodiversity and ecosystem services** - outline states of conservation and threats to biodiversity assets and ecosystem services, which might be from both inside and outside of your city, for example by using the City Biodiversity index (CBI).
- **Part D: Strategies and actions** - provides strategies and actions to put planning and management systems in place that protect and enhance the biodiversity in the case.

The Learning Process

We hope that this studio will be a rich learning process for both students and faculty. Students and faculty will be able to exchange views and ideas about city planning and biodiversity as the studio move along. We encourage instructors to provide some basic readings on cities and biodiversity planning to complement the studios. This process is important to provide inputs for guiding the future of biodiversity in cities. We hope that the studios can help to create knowledge for planning for biodiversity at the local level as well as creating the awareness in planning students about the importance of biodiversity , thereby participating in the implementation of the CBD and making our cities fairer and more sustainable.

References and Suggested Readings

Practical References

- The LBSAP Guideline (draft) prepared by ICLEI/UNU-IAS/SCBD
- Local Authorities and Biodiversity site of SCBD for information about the policy process at CBD: <http://www.cbd.int/authorities/>
- Decision X/22 and its annex The Plan of Action on Sub-National Governments, Cities and Other Local Authorities on Biodiversity. Available at <http://www.cbd.int/authorities/>
- The LAB Guidebook prepared by ICLEA provides useful examples of how to incorporate biodiversity planning into decision making and awareness in the community: <http://www.iclei.org/index.php?id=12138>
- Examples of LBSAPs prepared by LAB Pioneers: <http://www.iclei.org/index.php?id=12223>
- CBI - the City Biodiversity Index: <http://www.cbd.int/authorities/gettinginvolved/cbi.shtml>
- TEEB - The Economics of Ecosystems and Biodiversity. 2011. TEEB Manual for Cities: Ecosystem Services in Urban Management: www.teebweb.org
- CEPA Toolkit from CBD: <http://www.cbd.int/cepa/toolkit/2008/cepa/index.htm>
- Source various funding - Does money grow on trees? Published by CABESpace, available at: <http://www.cabe.org.uk/publications/does-money-grow-on-trees>
- A case of action plan in Durban City - Buffelsdraai Community Reforestation Project: http://www.durban.gov.za/City_Services/development_planning_management/environmental_planning_climate_protection/Projects/Pages/Buffelsdraai-Community-Reforestation-Project.aspx
- Natural Connections Strategic Plan and Biodiversity Action Plan (implementation plan for Natural Connections) in Edmonton Canada (not the same methodology as the CBD decision X/22, as CBI and TEEB had not come out yet, but it is good example of a plan of a leading city in the area):

http://edmonton.ca/environmental/natural_areas/natural-connections-conservati.aspx

Suggested Academic Bibliography

- Bierwagen, B.G. (2007), "Connectivity in urbanizing landscapes: the importance of habitat configuration, urban area size, and dispersal", *Urban Ecosyst.* 10: 29.42.
- Breuste, J. (2004), "Decision making, planning and design for the conservation of indigenous vegetation within urban development", *Landscape Urban Plan.* 68: 439.452.
- Elander, I., Lundgren, E., Malbert, B., Sandström, U.G. (2005), "Biodiversity in urban governance and planning: examples from Swedish cities", *Plan. Theory Pract.* 6: 283.301.
- Enrique de la Montana, et al. (2011), "Conservation planning of vertebrate diversity in a Mediterranean agricultural-dominant landscape", *Biological Conservation* 144(2011): 2468–2478, doi:10.1016/j.biocon.2011.07.001.
- Hull, et al. (2011), "Evaluating the efficacy of zoning designations for protected area management", *Biological Conservation* 144(2011): 3028–3037, doi:10.1016/j.biocon.2011.09.007.
- McKinney, M. (2002), "Urbanisation, biodiversity and conservation", *BioScience* 52: 883.890.
- Niemela, J. (1999), "Ecology and urban planning", *Biodiv. Conserv.* 8: 119.131.
- Pisupati, B. (2007), "Effective Implementation of NBSAPs: Using a Decentralized Approach: Guidelines for Developing Sub-national Biodiversity Action Plans", *UNU-IAS Policy Report*, United Nations University – Institute of Advanced Studies (UNU-IAS), Yokohama.
- Puppim de Oliveira, J.A., O. Balaban, C.N.H. Doll, R. Moreno-Penaranda, A. Gasparatos, D. Iossifova and A. Suwa (2011), "Cities, Biodiversity and Governance: Perspectives and Governance Challenges for the Convention on Biological Diversity at the City Level", *Biological Conservation* 144(5): 1302–1313, doi:10.1016/j.biocon.2010.12.007.
- Zerbe, S., Maurer, U., Schmitz, S., Sukopp, H. (2003), "Biodiversity in Berlin and its potential for nature conservation", *Landscape Urban Plan.* 62: 139-148.

UNU-IAS Policy Report

Integrating Biodiversity with Local and City Planning: The Experience of the Studios in the Development of Local Biodiversity Strategies and Action Plans - LBSAPs

Authors:

José A. Puppim de Oliveira
Wan-yu Shih
Raquel Moreno-Peñaranda
Adele Phillips

In collaboration with:



Institutional support from:

ICLEI – Local Governments for Sustainability
SCBD – Secretariat of the Convention on Biological Diversity

Contributions by Christopher Doll, Osman Balaban,
Andre Mader and Shela Patrickson.



UNITED NATIONS
UNIVERSITY

UNU-IAS

Institute of Advanced Studies

United National University
Institute of Advanced Studies
6F, International Organizations Center
Pacifico-Yokohama, 1-1-1 Minato Mirai
Nishi-ku, Yokohama 220-8520, Japan

Tel +81 45 221 2300
Fax +81 45 221 2302
Email unuias@ias.unu.edu
URL <http://www.ias.unu.edu>

