



## Urban Agenda Platform

The global platform for sharing progress, action and knowledge on the implementation of the New Urban Agenda to achieve sustainable urban development.

# Making land-use climate-sensitive: A project to increase resilience of cities against floods by integrating climate change into land-use planning

Region

Asia and the Pacific

Sustainable Development Goals

Goal 11 - Make cities and human settlements inclusive, safe, resilient and sustainable

## Summary

In recent years, many serious weather-related disasters such as floods and landslides occurred in Southeast Asia. One of the main causes of this is large-scale land transformation accompanying industrialization and urbanization, and there is concern that due to climate change, the problem will become even severer. Comprehensive land use management considering climate change is thought to be useful for the prevention and reduction of weather disasters.

## Background and Objective

**Situation Before the Initiative Began:** The city of Santa Rosa in the Philippines and the neighboring towns of Biñan, Cabuyao, and Silang are regularly hit by increasingly stronger storms. The massive amounts of rain overwhelmed the Silang-Sta. Rosa River and flood large parts of these towns, damaging the property of citizens (population: 570,000), including the poor living in riverside area. **Establishment of Priorities:** To address the floods, it was important to understand the cause of floods, estimate future floods and their damage to people and assets, and develop and mainstream countermeasures into policies and programs. IGES/UPLB provided technical support for the local governments to conduct these activities. With support from IGES/UPLB, a total of about 30 local government officials who were appointed by city/municipal mayors played the key role in each activity. **Formulation of Objectives And Strategies:** To prevent/alleviate floods, the project aimed to improve local land-use with consideration of future development and climate change by establishing and applying the approach called “Participatory Watershed Land-use Management (PWLM)” with the following steps: (1) scenario analysis, (2) risk assessment, (3) countermeasure development, and (4) land-use plan improvement. Various scientific methods such as GIS/remote sensing and hydrological modeling were used. Participatory approach was also used to engage stakeholders throughout the process. Technical aspects were undertaken by experts (i.e. IGES/UPLB) with the inputs from the local governments. Based on the scientific findings, the local governments revised Comprehensive Land-use Plans. **Mobilisation of Resources:** With financial support from MOEJ, IGES/UPLB provided technical resources. The local governments made in-kind contributions to the project by providing human resources of managers and their staff members who were in charge of the local policies in respect of climate change and land-use. Laguna Lake Development Authority (LLDA)—the government agency mandated of promoting sustainable use and development of the Lake Laguna area, including the Silang-Sta. Rosa watershed—provided guidance and supervision for the project. Save Silang Santa Rosa River (S3R2) Foundation that represents the private sector in the watershed also provided their support for the project in protecting trees and other vegetation to make it difficult for the river to overflow. LLDA leads the Integrated Watershed Management Council (IWMC) for the Silang-Sta. Rosa watershed, which consists of the four local governments as well as S3R2 Foundation as the council members. IGES/UPLB was responsible for managing technical and financial resources, while the local governments were responsible for managing their human resources.

## Actions and Implementation

The local governments participated in the entire project process or the four steps of PWLM approach mentioned in Section 3 of this application. The first step, scenario analysis, aimed at understanding the problems that the local governments faced in addressing natural disasters and other impacts of climate change, and also the future development and land-use that the local governments planned. Participatory rapid appraisal activities, specifically the key informant and focus group discussions and the participatory mapping, were conducted with representatives from the four local governments. About 30 officials participated in the discussions, who were in charge of urban planning, agriculture, environment, and disaster risk reduction and management. The officials were asked to draw a future land-use map as of 2025 on tracing papers overlaid on the current land-use map as of 2014. The second step, risk assessment, aimed to quantify the damage arising from floods due to typhoons and long periods of rain by identifying the areas, population, and structures such as infrastructure, buildings, and facilities, exposed to flood risks. Geographical information system (GIS) and remote sensing techniques were applied, and to estimate the population vulnerable to flooding in the subwatershed, a Landsat satellite image, national census population data, and a flood susceptibility map were used. The future land-use, obtained from Step one, was processed as GIS data. Step three, CCA&M measure development, aimed to devise possible climate actions for both adaptation and mitigation in consultation with the local governments and prioritize these actions according to



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their feasibility and urgency. Another focus group discussion session where a set of possible countermeasures were presented requested the officials to identify measures based on the needs of each local government. Further consultation then led to the identification of priority measures. Step four, land-use plan improvement, aimed to support local governments to strengthen their land-use and related development plans through dialogue on the recommendations generated from the previous three steps. It was a challenge to coordinate the local governments in project implementation because they had different and sometimes conflicting interests. To overcome this problem, the project established the Integrated Watershed Management Council (IWMC) that harmonizes the individual activities made by the local governments and makes collective efforts. IWMC organizes its regular meetings every other month to monitor and evaluate the progress in project implementation, particularly the improvement, implementation, and harmonization of land-use and other relevant plans created by the local governments.

## Outcomes and Impacts

To ensure the effective, smooth, and sustainable implementation of the project, the Integrated Watershed Management Council (IWMC) for the Silang-Sta. Rosa watershed established the Memorandum of Agreement (MOA), which set out the roles of responsibilities of council members that consist of Laguna Lake Development Authority, four local governments, and private sector. Following the MOA, the Implementation Rules and Regulation for IWMC were created. To further operationalize the IWMC, the work plan is currently being prepared with the description of activities, timeline, budget and responsibilities of council members.

## Gender and Social Inclusivity

The project can be scaled up in the Philippines and beyond. With the use of PWLM approach, the project is currently being replicated in the following two additional watersheds: Pila and Los Baños. Additionally, upon request from LLDA, the project will be further scaled up to the entire Lake Laguna basin that consists of 24 watersheds to reduce the vulnerability of cities in the basin against extreme weather events. Moreover, the training activities for other ASEAN countries on how to use PWLM will be organized in cooperation with the Climate Change International Technical and Training Center that is affiliated with the Thai government.

## Innovative Initiative

There are several key conditions required for addressing extreme weather events through the land-use approach. Firstly, coordination among local governments is essential in harmonizing land-use and development planning. As in the case of the Silang-Sta. Rosa watershed, the Integrated Watershed Management Council can serve this purpose, providing a mechanism for collective decision-making across the river basin. Secondly, the existence of national policies and guidelines stipulating the inclusion of climate factors within land-use planning engages the commitment of local governments. Thirdly, local knowledge on future development plans is indispensable as landuse planning begins with understanding of them. For more informed decision-making, detailed quantification of benefits from taking management actions is valued. In the case of the Silang-Sta. Rosa watershed, such benefits include the decrease in the number of damaged assets (e.g. buildings, infrastructure) and in the damage to economic activities (e.g. agriculture, manufacturing). It is ideal that these benefits can be accounted for in monetary terms, allowing the benefits to be compared with the costs of the actions. Future research needs exist in this kind of cost-benefit assessment.

## Conclusion

In addition to local policies such as the Comprehensive Land-use Plans (CLUPs) and the Local Climate Change Action Plans (LCCAPs), the project informed national policies. Laguna Lake Development Authority (LLDA), a national agency with the mandate to govern land and water uses in the overall Lake Laguna region, not only used the project's findings for the "Laguna de Bay basin master plan 2016 and beyond: Towards climate-resiliency and sustainable development," but also designated the project and the Silang-Sta. Rosa watershed as "A living laboratory for environmental management and governance" in the region with the hope to scale up the project's approach to other watersheds, particularly the following three watersheds that LLDA identified as the hotspots: Muntinlupa/San Pedro, San Cristobal, and Pagsanjan watersheds. Climate Change Commission (CCC) of the Philippines invited the project to its conference on Communities for Resilience (CORE) that is CCC's new initiative to expand/upgrade the existing Ecotown initiative, hoping that the project's PWLM approach would provide practical cases to promote the CORE initiative. References: No. Title Source Author Publication Title Volume Number Date Page Number 1 Vulnerability assessment using LiDAR data in Silang-Sta. Rosa subwatershed, Philippines Copernicus Publications Bragais, M. A., Magcale-Macandog, D. B., Arizapa, J. L., & Manalo, K. M. Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci. Vol. XLI-B8 2016 1397–1401 Edit 2 Participatory land-use approach for integrating climate change adaptation and mitigation into basin-scale local planning Sustainable Cities and Society Endo, I., Magcale-macandog, D. B., Kojima, S., Johnson, B. A., Bragais, M. A., Beatrice, P., ... Scheyvens, H. Sustainable Cities and Society 35(September 2016) 2017 47–56 Edit 3 Modeling future urban sprawl and landscape change in the Laguna de Bay area, Philippines Land Iizuka, K., Johnson, B. A., Onishi, A., Magcale-Macandog, D. B., Endo, I., & Bragais, M. Land 6(2) 2017 Edit 4 Integrating OpenStreetMap crowdsourced data and Landsat time- series imagery for rapid land use / land cover (LULC) mapping: Case study of the Laguna de Bay area of the



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