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# Urbanization adjacent to a wetland of international importance: The case of Olango Island Wildlife Sanctuary, Metro Cebu, Philippines

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ABSTRACT

The concentration of human population and development in wetland margins necessitated the identification and establishment of areas for conservation. However, change in the socio-economic and built-up environment particularly in urbanizing municipalities continue to impact the state of the protected wetland. This study highlights this phenomenon and focuses on the relation between urbanization and a wetland of international importance in Metro Cebu, Philippines. Urbanization adjacent to the Olango Island Wildlife Sanctuary (OIWS), the first Ramsar Site of the Philippines, is analyzed in terms of land cover change and population growth before and after the declaration of the protected area in 1992. The results show that percent change in urban cover intensified from 1973 to 1992 (1.29%) to 1992–2007 (18.53%). This can be attributed to the prioritization of the expansion of urban space in Metro Cebu. On the other hand, percent population growth is much higher in 1970–1980 (47.14%) and 1980–1990 (34.00%) before the proclamation of OIWS. Shift in the availability and accessibility of the types of primary and alternative sources of income in fishing communities indicate the influence of urbanization. Perceived problems in fishing reflect the environmental effects of urbanization such as oil spill, solid waste mismanagement, and reclamation projects that relate to the decrease in fish stock. Upon empirical evidence of the impact of OIWS to the restrained rate of urban cover expansion and population growth, education of surrounding urban population on the benefits of conservation should be enhanced. The geographical position of OIWS relative to areas of active urbanization requires a regional level evaluation of environmental quality of the protected ecosystem. This study recommends that conservation policies should take into account the historical urbanization phenomenon within the region of protected areas.


## 1. Introduction

A wetland is broadly defined as an “aquatic to semiaquatic ecosystem where permanent or periodic inundation or prolonged waterlogging creates conditions favoring the establishment of aquatic life” (Tiner, 2014). It is an assemblage of ecosystems providing wide-ranging types of ecosystem services (e.g. flood mitigation, water regulation, sediment retention, stream flow maintenance, wildlife habitat, food and fiber, recreation, among others) (Turner & Daily, 2008). Many of pre-historical human communities and development have occurred in wetland margins of seas, rivers, and lakes (Maltby & Acreman, 2011). More than one third of the world's population live in coastal areas and small islands that together make up 4% of the Earth's total land area (Barbier et al., 2008). This high population density in the coastal ecosystem including wetlands has made the ecosystem vulnerable to impacts of anthropogenic pressures such as urbanization (Ehrenfeld, 2000).

The interacting roles of the environment, population, and resources vary according to its complex relationship with the level of economic development (Meadows, Meadows, & Randers, 1992; Panayotou, 2003; de Sherbinin, Carr, Cassels, & Jiang, 2007). The physical modification of the environment in urbanized areas is accompanied by change in the biological and ecological system that can be both permanent and large in scope (Ehrenfeld, 2000). Others argue that urbanization has the greatest ability to impact wetland hydrology and water quality of all the land uses (Horner, 2001; Lee et al., 2006). Urban development proximal to wetlands affects its capacity to maintain and regulate faunal communities, increases the average runoff and sedimentation, contributes to heavy metal pollution, and decreases species richness (Grove, Harbor, Engel, & Muthukrishnan, 2001; Horner, 2001; Faulkner, 2004; Lee et al.,

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2006; Fang et al., 2014; Lowe, 2014).

As wetlands become urbanized areas, change in the living conditions of coastal communities is also expected. For example, loss of livelihood can hinder sustainable urban development. A number of factors that affect the environmental integrity of wetlands such as poverty and economic inequality, pressure from population growth, immigration and mass tourism, and social and cultural conflicts (Kontogianni, Skourtos, Langford, Bateman, & Georgiou, 2001) suggest that the urbanization in the region have a negative "spill-over" effect to the protected wetland ecosystem. While on the other hand, adjacent communities in urban areas are benefitting from the ecosystem services of the relatively better quality of the protected wetland. Realizing the complexity of the coupled urbanization and conservation agenda, urban areas become an arena to improve policies addressing issues on sustainability emphasizing social, economic, and spatial development (Varol, Ercoskun, & Gurer, 2011).

This context is observed in Metro Cebu where the Olango Island Wildlife Sanctuary (OIWS) is located. The rate of urbanization in adjacent coastal areas of OIWS in Metro Cebu could threaten the long-term sustainability of the conservation benefits that the local population is receiving from the relatively improved quality of the wetland ecosystem. This study postulates that the enhancement of the conservation program in OIWS could be achieved by, firstly, analyzing the urban land cover in coastal areas of Metro Cebu adjacent to OIWS before and after the establishment of the reserve. Secondly, to describe the influence of urbanization to local fishing communities by characterizing the household socio-economic conditions. Integration of these results attempts to discuss mechanisms on how to potentially engage multiple actors to improve the conservation objectives of OIWS by taking into consideration the urbanization phenomenon.

### *1.1. The Olango Island Wildlife Sanctuary and urbanization in Metro Cebu*

The Olango Island Wildlife Sanctuary located in Metro Cebu was proclaimed as a Wildlife Sanctuary under Proclamation No. 903 on May 14, 1992 of which administration and control were given to the Philippine Tourism Authority (Management Plan for Olango Wildlife Sanctuary, 1992). It is approximately 5, 800 ha of low-lying areas of intertidal sandflats, mangroves, seagrass beds, coral reefs, and islets (Ramsar, 2014). It was eventually declared the first Ramsar Site in the Philippines specifically as a wetland of international importance as waterfowl habitat on November 8, 1994. According to the Management Plan for Olango Island Wildlife Sanctuary (1992), Olango has a rich diversity of invertebrate organisms particularly zoobenthic species that made the island ideal for roosting and feeding of migratory waterfowls, making it famous as a tourism site for bird watching. Olango Island is an internationally important site in the East-Asian Australasian Flyway, hosting 40,000 individuals of migratory birds belonging to 48 species (http://www.olangowildlifesanctuary.org/). Among these several are declining or have small populations such as the Chinese Egret (*Egretta eulophotes*), Asian dowitcher (*Limnodromus semipalmatus*), Eastern Curlew (*Numenius madagascariensis*), and the Great Knot (*Calidris tenuirostris*) (Management Plan for Olango Wildlife Sanctuary, 1992; ASEAN Centre for Biodiversity, 2014).

Aside from the ecotourism model and the Ramsar framework of the Convention on Wetlands, OIWS is also an initial component of the National Integrated Protected Areas System (NIPAS) of the Philippines being officially declared as protected area one month before the enactment of NIPAS. However, external factors could threaten the protected landscape according to the OIWS Management Plan (1992). These include coastal development, population pressure, and the availability of livelihood and employment opportunities.

Metro Cebu serves as the center of economic activity in the central and southern part of the Philippines. It is comprised of seven cities and six municipalities and is the second largest urban area in terms of population size in the Philippines next to Metro Manila. Urbanization and increase in population have challenged Metro Cebu with environmental issues including poor road network, increasing motorization, traffic congestion, air pollution, mismanaged solid waste disposal, decreasing water supply, and drainage (Gonzales, 2004). Coastal reclamation in Metro Cebu is also a popular way to expand space and accommodate the development of economic activity of export-oriented industry and foreign direct investment (Katahira and Engineers International, 1993). Coastal reclamation projects incur environmental costs. Environmental costs could be estimated from the project's major environmental impacts such as the loss of on-site fisheries, the loss of reef gleaning, the loss of potential recreational benefits from the affected coral reef, and the environmental damage from landfill quarrying (Montenegro, Diola, & Remedio, 2005).

This study focuses on two urbanizing municipalities and one city within Metro Cebu to provide empirical characterization of the socio-economic conditions of fishing communities adjacent to OIWS. These include Cordova, Consolacion, and Lapu–Lapu City. The municipalities of Cordova and Consolacion are urbanizing municipalities where there is an overflow of economic activities from its nearby urbanized cities. The municipality of Cordova that is adjacent to Lapu–Lapu City has major land-uses as residential and mixed-use areas that primarily cater subdivisions, commercial industries, and other industries. Being an island municipality, it has an estimated 3500 ha of intertidal flats which serve as fishing grounds and gleaning area for its residents.

Consolacion is an urbanizing municipality located in the Cebu Main Island comprised with a total of 21 *barangays* (villages). It continuously receives the overflow of economic gains from its highly urbanized neighbors such as Mandaue City and Cebu City resulting to the need for expansion on residential, commercial, and industrial areas. Such urban development is being limited by the geographical condition of Consolacion that is generally hilly and mountainous. To expand its space for the anticipated economic gain, its local government is eyeing for reclamation projects that will be allocated for institutional, commercial, and tourism estates purposes.

On the other hand, Lapu–Lapu City is a first class highly-urbanized city having known to have the second busiest airport in the Philippines, Mactan Export Processing Zones (I & II), Cebu Light Industrial Park and numerous other industries such as dry-docking, oil companies, and ship-building repair. Numerous well-known beach resorts and high-end hotels are also located in Lapu–Lapu City such as the Hilton Hotel and the Shangrila-Mactan Resort, the venue of the 12th ASEAN Summit.

## 2. Methods

It is critical to map and monitor the pressures of human activities to protected areas over time (Nagendra et al., 2015). In this study, the urbanization in the Metro Cebu area adjacent to OIWS was analyzed by mapping the urban land cover in relation to population growth before and after the declaration of OIWS. A schematic diagram of land cover change analysis is presented in Fig. 1.

Of the seven cities and six municipalities of Metro Cebu, the land cover of three cities—Cebu City, Mandaue City, and Lapu–Lapu City—and two municipalities—Consolacion and Cordova—in 1973, 1992, and 2007 were mapped. Being an island city and

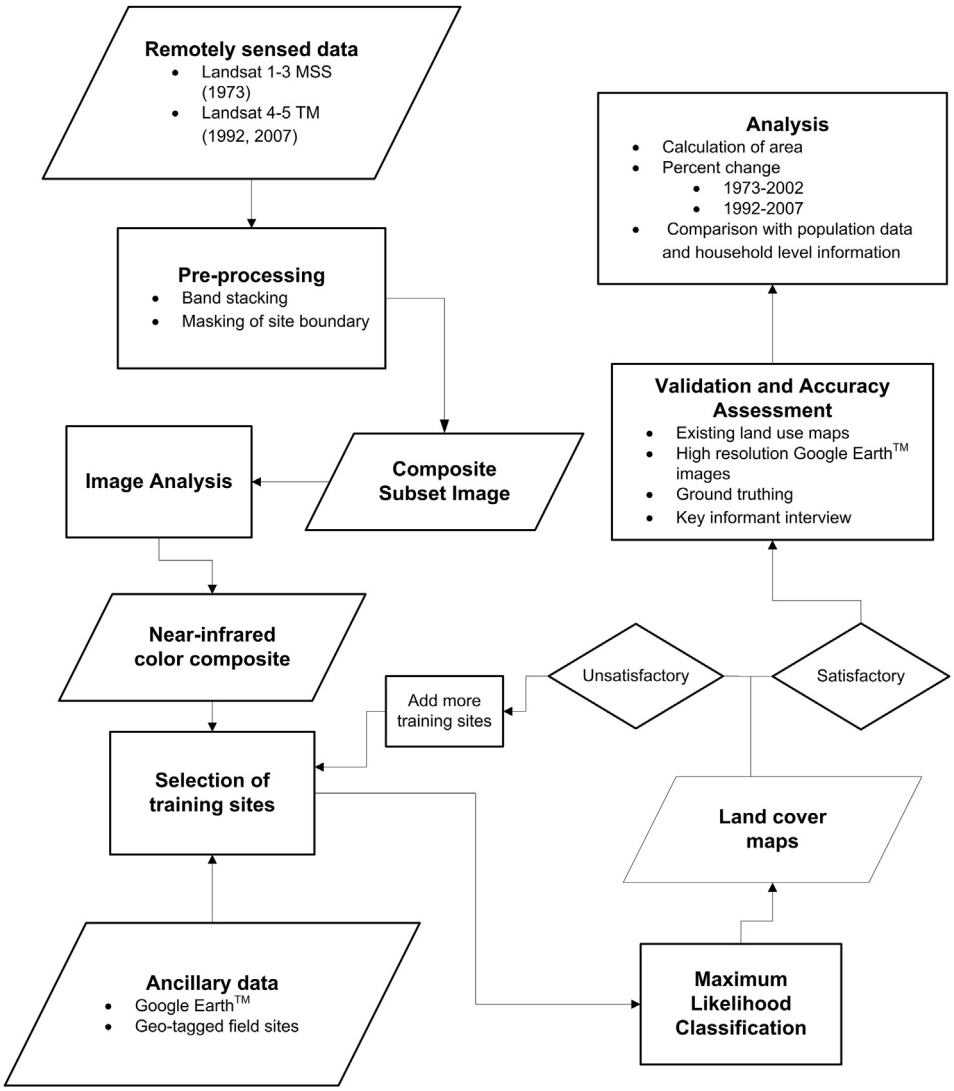


**Fig. 1.** Schematic diagram for land cover change analysis of selected coastal areas in Metro Cebu, Philippines.

municipality, the whole administrative area of Lapu–Lapu City and Cordova in Mactan Island were included in the land cover change analysis whereas only the coastal areas of Cebu City, Mandaue City, and Consolacion situated in the Cebu main island were analyzed (Fig. 2). These coastal areas of the Cebu main island were defined by the 5-km distance from the coastal administrative boundary to inland. This area was identified to be where urbanization is concentrated based from remotely sensed data of 1973, 1992, and 2007. Hafner (2002) also supports that the core of urbanization in Cebu Province is located in this narrow strip of coastal area of the Cebu Main Island.

Images captured by the Landsat earth observational satellites were obtained from the U.S. Geological Survey (USGS) Earth Explorer website (USGS, 2014). The 1973 image was captured by Landsat 1–3 Multispectral Scanner (MSS) while Landsat 4–5 Thematic Mapper (TM) provided the 1992 and 2007 images. Land cover classification of remotely sensed data is a universal method to detect urban areas comprising of residential, commercial, and industrial infrastructures that are spectrally different from the cover of the natural environment such as vegetation and water bodies (Weber, 2001).

Land cover classification was defined according to Anderson's classification scheme (Anderson, Hardy, Roach, & Witmer, 1976). This scheme is a flexible hierarchical system that can be classified into multiple levels. These levels depend on the detail available in the source material that may include housing density, road density, spectral reflectance, and degree of land disturbance, among others. Both the MSS and TM scanner have been extensively used to map urban land cover but the relatively low spectral resolution of MSS (79 m/pixel) and TM (28.5 m/pixel) only allows up to Level II classification of the Anderson classification scheme (Stefanov, Ramsey, & Christensen, 2001). For the purpose of this study, Level I classification is sufficient to demonstrate the hypothesis that an intensified urban sprawl is a phenomenon in the coastal areas of Metro Cebu prior to the proclamation of OIWS. Therefore, the derived land cover classes were urban or built-up, forest, and wetland. The extent of the urban or built-up land cover class is characterized by the relative concentration of built infrastructures and the existence of dense systematic street patterns, which are highly associated to commercial, industrial, transportation, communications, and services as well as densely populated residential areas. This feature class also includes areas where roads are built with less intensive use such as residential, schools, and cemeteries that are relatively undeveloped.

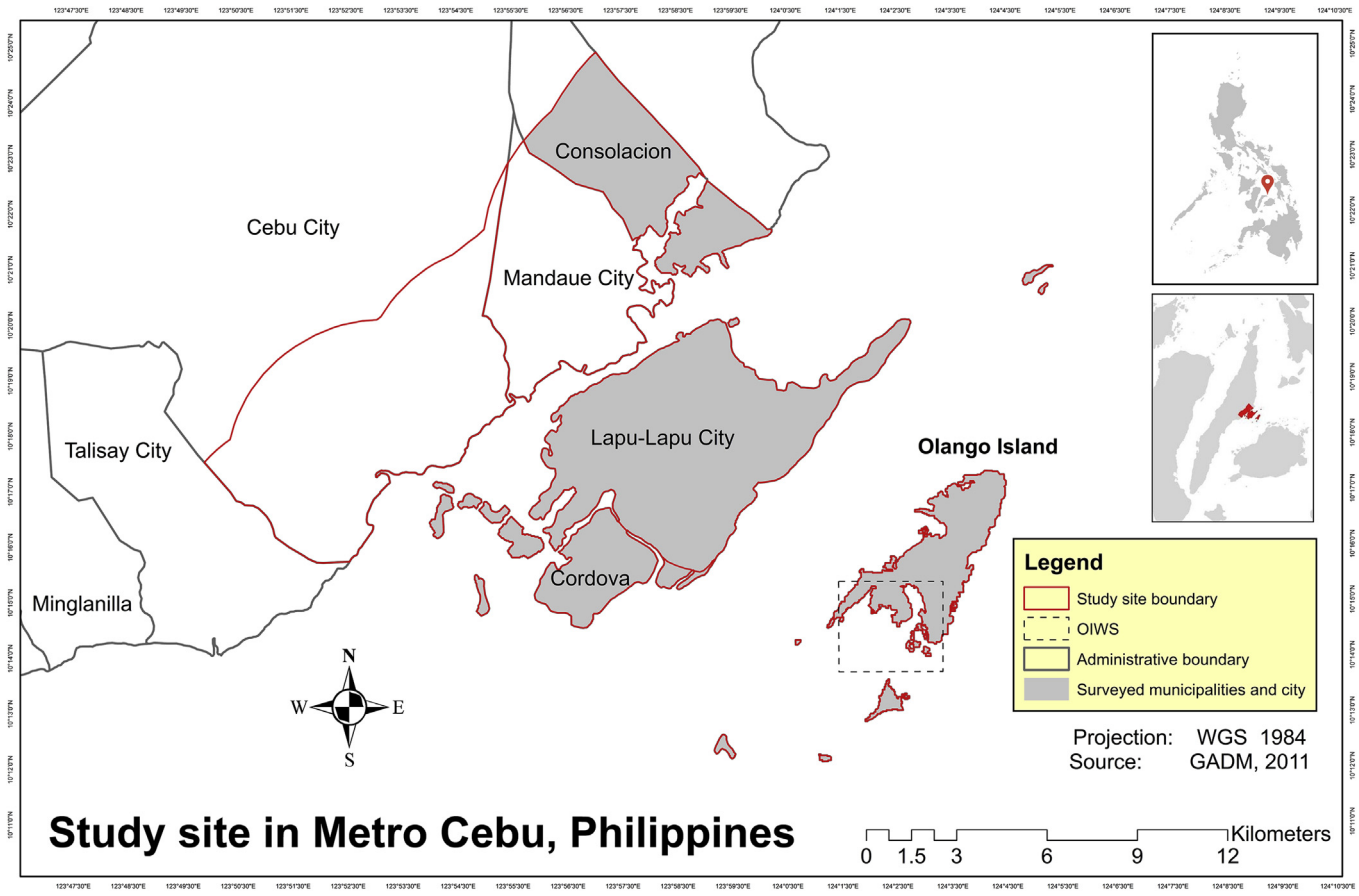


**Fig. 2.** Study site map.

Maximum likelihood classification was performed to classify the land cover into the three desired feature classes. Also known as the supervised raster classification, this type of classification is suitable if the modeler has reliable knowledge about land cover in the site. Near-infrared color composite images were used to easily distinguish urban and vegetated cover classes according to its reflectance values. Training samples were identified based from known locations of the desired feature classes to create signature files. Selection was supplemented by ancillary data such as high resolution imagery and geo-tagged areas from field surveys. The method works under the assumption that each feature class has equal probability weights attached to the values of their respective signature.

The output raster was assessed whether the classification was satisfactory or not by comparing ten random samples from each feature class with Google Earth™ satellite images and available land use maps. Due to the lack of high resolution reference images in 1973 and 1992, validation was supplemented by historical accounts from key informants. More training sites were generated when the assessment was unsatisfactory. Results were doubtlessly valid because this study only aimed to visually present the spread of urban or built-up in the region. Thus, Level 1 Anderson classification was sufficient enough. In addition, the near-infrared composite image is the most used band composition to differentiate vegetated (forest) with non-vegetated (urban or built-up and wetland) area.

The study supports the idea that land cover change analysis can be more comprehensive and detailed if interpretation is based from a combination of different levels of information (Lorena & Lambin, 2009). To supplement the analysis, fishing communities were also surveyed in the municipalities directly adjacent to OIWS to describe the influence of urbanization. The municipalities were chosen based on population, land area, total number of coastal barangays, and economic development. The survey used a structured interview schedule translated into the local language (Cebuano). This survey was used to characterize the socio-economic and demographic characteristics of the population. It employed both closed and open-ended questions that were grouped into three sections, namely: I-Demographic Characteristics, II-Livelihood Activities and III- Fishing Trends. Actual household respondents were selected through systematic random sampling of 384 households in the three selected study areas. From this analysis, recommendations on how to enhance the current conservation model is proposed primarily by rethinking about urban land use planning in the region and engaging marginal fishing communities adjacent to OIWS.

## 3. Results and discussion

### 3.1. Land cover change and population growth

Comparison of remotely sensed land cover map, available land use maps, historical population data, and household level information indicate that there is an increasing trend of urbanization in the coastal areas of Cebu Main Island adjacent to OIWS from circa 1970 to 2010. In 1973, it was concentrated in Cebu City in the main island of Cebu Province (Fig. 3 and Table 1). While urbanization spread to Mandaue City and Consolacion from Cebu City, portions of forest cover in Lapu–Lapu City and Cordova were converted into

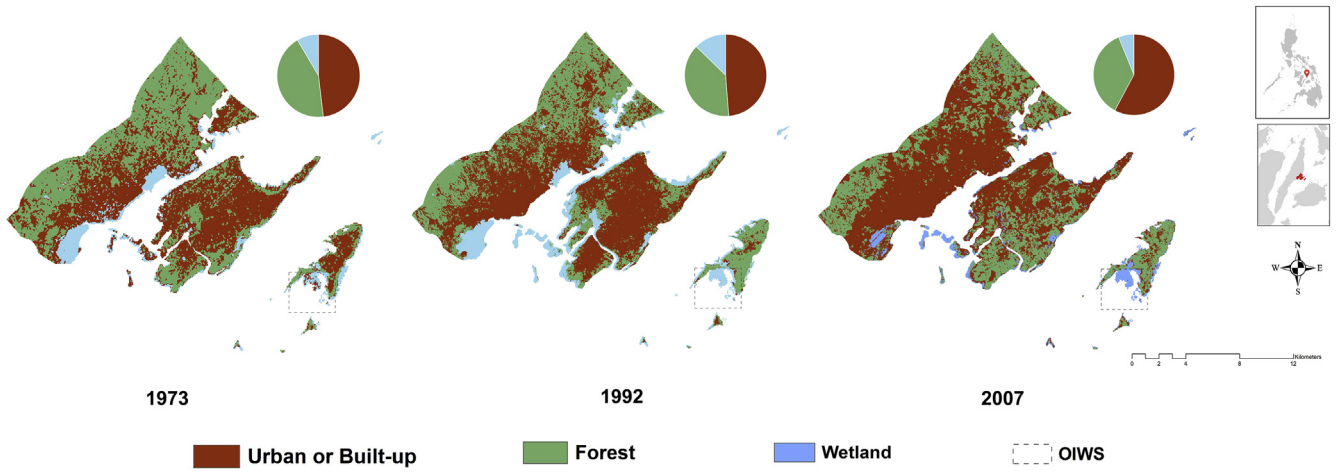


**Fig. 3.** Land cover in 1973, 1992, and 2007.

**Table 1**
Land cover in coastal areas of Metro Cebu, Philippines adjacent to OIWS.

| Land cover | 1973 | | 1992 | | 2007 | | Percent change | |
|---|---|---|---|---|---|---|---|---|
| | Area (ha) | % Total | Area (ha) | % Total | Area (ha) | % Total | 1973–1992 | 1992–2007 |
| Urban or Built-up | 8875.08 | 48.14 | 8989.58 | 48.78 | 10,655.73 | 57.82 | 1.29 | 18.53 |
| Forest | 7995.60 | 43.37 | 7097.44 | 38.51 | 6639.57 | 36.03 | −11.23 | −6.45 |
| Wetland | 1564.56 | 8.49 | 2341.23 | 12.70 | 1134.00 | 6.15 | 49.64 | −51.56 |
| Total | 18,435.24 | 100.00 | 18,428.25 | 100.00 | 18,429.30 | 100.00 | – | – |

urban or built up. Rate of increase in urban cover intensified between 1973 and 1992 (1.29%) and 1992–2007 (18.53%). Forest cover change declined from 1973 to 1992 (−11.23%) and 1992 to 2007 (−6.45%). This can be attributed to the prioritization of the expansion of urban space in Metro Cebu such as through reclamation projects. On the other hand, OIWS remained intact since its establishment. Land cover change analysis illustrated that the urban or built-up cover within Olango Island decreases since the proclamation of the protected area wherein vegetation growth recovered in the island. There was an approximate −74.93% change in built-up cover from 1973 to 1992 in Olango Island while there was an estimated increase of 72.80% from 1992 to 2007.

The increase in urban cover from circa 1970 to 2010 corresponds to the continued population growth in Metro Cebu. Decadal population data from 1970 to 2010 (Table 2) show that the intensification of urbanization by expansion of urban cover was coupled with increase in population. On average, the study site comprises 72% of the total population of Metro Cebu from 1970 to 2010. Computed average annual growth rate of villages within the site is also close to the Metro Cebu values. Percent increase in population is highest in Mandaue City with as much as 88.79% from 1970 to 1980 and 62.54% from 1980 to 1990. On the other hand, the succeeding years after the declaration of OIWS in 1992 show a decline in percent change in population growth. Total population increase from 1990 to 2000 (27.87%) and 2000–2010 (32.03%) were relatively lower than that of the increase in 1970–1980 (47.14%) and 1980–1990 (34.00%). Such decline may be attributed to the policy restrictions imposed by the proclamation of OIWS. Change in spatial patterns indicates that urbanization and the declaration of OIWS result to changes in land cover and population growth. It can be said that opportunity, particularly employment, in the urban coastal area of Metro Cebu have proven to accommodate the demand of the growing population. This interpretation can be best explained by the results of the household survey conducted in fishing communities adjacent to OIWS.

**Table 2**
Population of selected cities and municipalities within the study site in Metro Cebu, Philippines.

| City/ Municipality | Population | | | | | Percent change[a] | | | | Average annual growth rate[a] | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1970 | 1980 | 1990 | 2000 | 2010 | 1970–1980 | 1980–1990 | 1990–2000 | 2000–2010 | 1970–1980[b] | 1980–1990[b] | 1990–2000 | 2000–2010 |
| Cebu City | 327,335 | 460,951 | 568,250 | 658,740 | 778,588 | 40.82 | 23.28 | 15.92 | 18.19 | 3.5 | 2.1 | 1.5 | 1.7 |
| Mandaue City | 58,752 | 110,917 | 180,285 | 252,995 | 331,320 | 88.79 | 62.54 | 40.33 | 30.96 | 6.6 | 5.0 | 3.4 | 2.7 |
| Lapu–Lapu City | 69,537 | 99,107 | 146,194 | 217,019 | 350,467 | 42.52 | 47.51 | 48.45 | 61.49 | 3.6 | 4.0 | 4.0 | 4.9 |
| Consolacion | 16,319 | 25,452 | 38,231 | 58,759 | 102,039 | 55.97 | 50.21 | 53.69 | 73.66 | 4.5 | 4.2 | 4.4 | 5.7 |
| Cordova | 12,541 | 16,459 | 22,331 | 34,032 | 50,353 | 31.24 | 35.68 | 52.40 | 47.96 | 2.6 | 3.1 | 4.3 | 4.0 |
| **Total** | **484,484** | **712,886** | **955,291** | **1,221,545** | **1,612,767** | **47.14** | **34.00** | **27.87** | **32.03** | **3.9** | 3.0 | **2.5** | **2.8** |
| Metro Cebu | 654,289 | 945,258 | 1,266,919 | 1,693,881 | 2,551,100 | 44.47 | 34.03 | 33.71 | 50.61 | 3.7 | 3.0 | 2.9 | 4.2 |
| % Metro Cebu | 74.05 | 75.42 | 75.40 | 72.12 | 63.22 | – | – | – | – | – | – | – | – |

Source: Philippine Statistics Authority.
[a] Rounded values.
[b] Calculated values based from municipal/city level data.

### 3.2. Socio-economic conditions of surveyed respondents

#### 3.2.1. Demographic profile

Population across the surveyed sites is middle-aged with majority (68%) falling under the working age bracket of 30–59 while only 8% belong to the older population of 60 years and above. This suggests that there is an abundance of labor force necessary for an urban center such as Cebu City and Mandaue City which economic activity calls for more working individuals. The large working age population and the relatively low educational attainment could be potentially tapped as manual labor force in the proximate urbanizing space.

The main source of livelihood in surveyed communities within the 10-km radius of OIWS—Lapu-Lapu City and Cordova— is still primarily fishing. Despite the rapidly urbanizing space, households in these fishing communities retain a strong dependence to the coastal resources for living. Farther away from the vicinity of the protected area, 33% of respondents in Consolacion in Cebu main island are already engaged in types of employment in the urban and industrial areas particularly as factory workers. Fishing ranks second among respondents' primary source of livelihood in Consolacion. Around 53% of the total respondents in the three study sites are working in factories for alternative income. The availability and accessibility of the respondents to these types of job is an indicator of urbanization.

With the mixed employment opportunities in fishing and urbanized areas, majority (46%) of the total respondents are earning PhP 1000–5000/month (25–125 USD) that is within the set PhP 1564 (35 USD) monthly per capita poverty threshold of the Philippines in 2012 (Philippine Statistics Authority, 2006). About 26% and 20% of the respondents are earning PhP 5000–10,000 (125–250 USD) and less than PhP 1000/month (25 USD), respectively. Only about 5% of the respondents are receiving a monthly income of PhP10,000–15,000 (250–375 USD) while a smaller percentage of 2% enjoy a monthly salary of more than PhP 15,000 (375 USD). Despite a skewed distribution of income in the community and the relatively low monthly salary, respondents have a considerable long period of residency. Half of the total respondents claimed that they have resided in their respective municipality/city for about 26 years and above. The decision to stay in the area could be influenced by the growing employment opportunities in Metro Cebu and the perceived socially acceptable level of fishing condition near the OIWS.

#### 3.2.2. Fishing condition

The current status of fishery activities in the coastal communities in Metro Cebu is directly related to the myriad of issues and problems brought about by urbanization. Perceived problems for fisherfolks were grouped into three (Table 3). Decreasing fish stocks ranks first among the perceived coastal problems as mentioned by 36% of the total respondents.

Problems related to the exploitation of the fishery resources in coastal areas of Metro Cebu similarly describe the prevailing issues of fishing communities in the Philippines and in the world. Silvestre (1989) claimed that various fishing areas in the Philippines are already fully to or even overexploited. This finding is similar to the perception of the fisherfolks who feel that urban development affects their fishing activities and causes deterioration of fishing areas and decrease in fish stocks near OIWS. This is further compounded by natural hazards and the continued unabated problems on illegal fishing practices and/or the lack of appropriate fishing gears.

Oil spill and unmanaged solid wastes are also seen by the fisherfolks, particularly in Consolacion and Lapu–Lapu City, as important issues that affect the water quality. Consolacion and Lapu–Lapu City are geographically located adjacent to the Gilutongan Channel that is a major route of ships and cargoes from the international port of Cebu City. Adjacent to the municipality of Consolacion are the various industries and residential areas in Lapu–Lapu City that may have contributed to the occurrence of oil spill and solid waste problems.

This study provides the empirical basis for the ongoing urbanization in coastal areas adjacent to a wetland of international importance as well as the socio-economic conditions of its surrounding coastal population. The intensification of urban cover in coastal areas is spatially captured in the land cover change analysis. The trend for both urban cover and population growth is increasing in the OIWS area of Metro Cebu but the rate of population increase slowed down since the declaration of OIWS as protected area. Survey results of this study also show that intensification of urbanization influence the socio-economic conditions of fishing communities in the three sampled sites. In particular, employment opportunities of artisanal fisherfolks expand to include service-, commercial-, and industrial-related labor. Decrease in fish stocks and degradation of water quality are also attributed to the conversion of land use and land cover to urban since the 1970s.

## 4. Implications of the study

Several studies provide empirical basis that environmental degradation is highly dependent upon the stages of economic development primarily in terms of per capita income (Islam, Vincent, & Panayotou, 1999; Hanna, 2008; Akbostanci, Turut-Asik, & Tunc, 2009; Vollebergh, Melenberg, & Dijkgraaf, 2009). The dynamics of socio-economic factors— economic modernization, land rent and market access, land ownership regime, global trade, and the global diffusion of conservation values—play a pivotal role in land use and cover transition affecting the state of the environment (Lambin & Meyfroidt, 2010). The environmental Kuznets curve

**Table 3**
Issues and problems related to fishing in selected coastal communities, Metro Cebu.

| Problems | Consolacion | | Cordova | | Lapu–Lapu city | | Total | |
|---|---|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % | No. | % |
| **Exploitation-related** | | | | | | | | |
| Natural hazards | 8 | 25 | 11 | 15 | 17 | 24 | 36 | 20 |
| Increased number of fisherfolks | 2 | 6 | 4 | 6 | 7 | 10 | 13 | 7 |
| Decreasing fish stocks | 9 | 28 | 42 | 58 | 13 | 19 | 64 | 36 |
| Illegal fishing practices | 5 | 16 | 7 | 10 | 9 | 13 | 21 | 12 |
| Lack of appropriate fishing gears | – | – | 4 | 6 | – | – | 4 | 2 |
| **Pollution** | | | | | | | | |
| Oil spill | 1 | 3 | – | – | 5 | 7 | 6 | 3 |
| Solid wastes | 3 | 9 | 1 | 1 | 2 | 3 | 6 | 3 |
| **Institutional/policy** | | | | | | | | |
| Reclamation | 2 | 6 | – | – | 7 | 10 | 9 | 5 |
| Bantay Dagat (Sea Patrol) Apprehension | 2 | 6 | 3 | 4 | 10 | 14 | 18 | 10 |

defines this environment–development relationship by relating that environmental quality may change along the path of economic development from negative to positive as the people reach a level of income stability that could afford them more efficient infrastructure and a cleaner environment (Panayotou, 2003; Stern, 2004).

The ongoing urbanization in Metro Cebu raises the need to urgently improve land use planning that takes into the alignment of the regional, local, and the site-specific concerns of OIWS as a wetland of international importance. At current rate, results of this study calls for a holistic planning process that would cover the adjacent cities and municipalities of OIWS, and would require an integrated planning process. So far, such nature of planning is not yet achieved given that each of these municipalities prepare their own comprehensive land use plans (CLUPs) irrespective of each other. Major priorities of the current CLUPs of these cities and municipalities are allocation for urban and built-up areas as has been confirmed by the results of the land cover classification analysis of this study. On the other hand, the CLUP of Lapu–Lapu City, the local government unit where OIWS officially fall under, does not likewise identify concrete measures how it could be made consistent with the conservation agenda of OIWS.

Given that the underlying factors affecting urbanization in the area that hosts a wetland of international importance clearly transcend various local government units, the management plan of a wetland must likewise address urban development challenges posed by its adjacent areas and the region. So far, the current management plan of OIWS needs to directly identify actions in response to challenges brought about by urbanization. As a critical way to start operationalizing the alignment between the OIWS management plan and the comprehensive land use plans of adjacent local government units, all sitting local government representatives of the Protected Area Management Board (PAMB) of OIWS must be encouraged to ensure that the conservation agenda of OIWS be incorporated in their respective plans.

In addition, while the impacts of urbanization are within the consciousness of the surveyed population, the local fishing communities in the urbanizing areas of Metro Cebu are bounded by materialist values to attain their minimum economic security. There is little motivation and inspiration about the unrealized conservation benefits from OIWS when the fishing communities alone could not address their perceived fishing problems such as decrease in fish stock and degraded water quality. Policy should emphasize accessibility and availability of employment opportunities in the urbanizing centers for the coastal communities under a sustainable urban development framework. Decision-makers should allocate capital to innovate more efficient environmental impact mitigation measures relative to the conservation of OIWS.

This paper further supports the idea that participatory engagement to decision-making of the different sectors could catalyze the cultivation of a conservation value by recommending poverty reduction strategies. The ecotourism framework of OIWS claims to provide the mechanism on how to conserve the wetland by utilizing its high economic potential and allocating the dividends to the local population. It suggests that provision of labor and income generation for the local communities through sustainable tourism would eventually make them realize of its wildlife and conservation values (Eagles, McCool, & Haynes, 2002). However, the conservation framework of OIWS needs to be further strengthened to address the contemporary environmental issues from pressures of urbanization in Metro Cebu. The emergent complexity of the coupled urbanization and conservation agenda has become a matter of environmental governance.

Environmental governance has reasserted great value to the importance of multi-actor participation to the success of conservation (see Schenk, Hunziker, & Kienast, 2007; Eneji et al., 2009; Tisdell, Nantha, & Wilson, 2007; Johansson & Henningsson, 2011). A contextual approach to conservation also suggests that management should be integrated into the local institutions, practices, and social structures of the locality (Lejano, Ingram, Whiteley, Torres, & Agduma, 2007). Among the frameworks for multi-actor participation (Alper, 2004), the instrumental role of the local governments as motivators of environmental initiatives across political boundaries could be used as a model. This state-centric approach, as Blatter and Ingram (2000) explained, does not assume that non-government actors are irrelevant but only that local governments should primarily be action-inducing as they are mandated to do so. This is especially appropriate in the context of OIWS that is geographically embedded in an urbanizing environment where identification of priority areas for development is a result of state-defined legitimacy. In order for greater conservation dividends to be realized in OIWS, the local government must empower its marginal constituents by creating a system that organize the sectors for them to be identified as holders of a legitimate position in the decision-making process. This implies that the coupled urbanization and conservation discourse also tackles the issue on social inequality. The state-motivated model of multi-actor participation reasserts the mandated function of the local government to uphold service for the public's well-being. Organizing also means educating the people of their rights that includes not just the basic human rights, the enforcement of law, and the benefits they could get from the improved quality of OIWS but more importantly the acknowledgment and acceptance of their matching responsibilities and duties.

It is important to note in this discussion that multi-actor participation and engagement should be seen as an incremental process that involves discrete stages. It should be an iterative and dynamic relationship building between and among decision-makers in the legislative and executive side of the government and the different sectors of the society including the marginalized fishing communities. There should be a platform that harmonize research, policy, and development agenda of conservation and urban land use planning through the initiative of the local governments in Metro Cebu. As claimed by Somarriba-Chang and Gunnarsdotter (2012), multi-actor participation should be assisted by governmental support in terms of capacity and resources and of local entrepreneurship to empower the people.

## 5. Conclusion

Analysis in this study validated the spatial extent of urbanization in Metro Cebu adjacent to OIWS and its apparent influence to the socio-economic conditions of fishing communities. While the economic growth in urbanizing areas near the protected area of Olango Island is flourishing, many of the fishing communities are now engaged in urban and industrial centers for primary and secondary sources of income. Results have also acknowledged the priorities of the local population to achieve economic security, which policy-makers must consider if greater conservation dividends from OIWS want to be realized. The need to include the adjacent marginalized fishing communities of OIWS in the decision-making process to be initiated by the government could provide an opportunity to improve the management of wetlands of international importance, such as OIWS, while addressing pressures of urbanization at a regional scale.

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