1. Introduction

Cagayan de Oro is a boomtown located on the central coast of Northern Mindanao in the Southern Philippines. Its total land area is about 48,885 ha. Of this area 44.7% is classified as agricultural and 38.4% as open space. Annual rainfall is 1,600 mm per year. The mean annual temperature is $27^\circ$C.

About 500,000 people presently live in Cagayan, predominantly in urban areas. The annual population growth is 4.4%, compared to 2.3% nationally. Since 1960, the population has doubled. The number of households increased to 84,085 in 1995 - an increase of 21,589 households since 1990. The average household size declined from 5.4 persons to 5.1 persons over the same five-year period. Eighty-two percent of the population lives in urban areas. Population density is 3,519 persons/km$^2$ in urban barangays$^1$ and 203 persons/km$^2$ in periurban$^2$ ones. The average population density is 876 persons/km$^2$.

The population of Cagayan de Oro is young; the median age is 20.6 years (National Statistics Office 1997). Thirty-seven percent of the population is between 0 - 14 years, 61% is in the productive age group between 15 - 64 years and 2.4% is 65 and older.

Agriculture employs about 9% of the total economically active population (City Planning and Development Office 1995).

In Cagayan, 79% of the land is periurban and 21% is urban. Topographically, the city covers: a) 33,000 ha of coastal land (ca. 70%); b) 12,000 ha of hilly and mountainous land (ca. 25%); and c) 3,800 ha of riparian land (ca. 5%). Of the 22,000 ha allocated by the city for agriculture, only 2,276 ha (10%) is used for crop production. Some farming occurs on steep and rocky "marginal" areas, of which another part is dedicated to forestry. Though actual figures are not available, it is estimated that about 50% of agricultural areas are solely dedicated to agriculture.
The soils in periurban barangays are regarded as first class, while the commonly found soils in urban barangays are regarded as second class.

<table>
<thead>
<tr>
<th>Actual land use</th>
<th>Area (ha)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural</td>
<td>21,845</td>
<td>44.7</td>
</tr>
<tr>
<td>Open spaces</td>
<td>18,775</td>
<td>38.4</td>
</tr>
<tr>
<td>Residential</td>
<td>4,669</td>
<td>9.6</td>
</tr>
<tr>
<td>Others</td>
<td>2,751</td>
<td>5.6</td>
</tr>
<tr>
<td>Industrial and commercial</td>
<td>815</td>
<td>1.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>48,885</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Source: Cagayan de Oro City Assessment Department 1995.

Most agricultural lands are situated in periurban areas. This land is largely owned by private individuals who have tenants to till the land. More than 18,000 ha covering the coastline, parks and plazas, all river islands and all areas designated for approved commercial and residential subdivision plans, are classified as open spaces. Some of the open spaces in both urban and periurban areas are used for urban agriculture.

2. Urban agricultural production

In the periurban areas of Cagayan de Oro, some 13,000 small-scale farmers and tenants (of whom 3,000 are women) produce on 2,276 ha of land (1995). They produce rice, maize, banana, coffee, root crops, fruit and vegetables, for both home consumption and market sales. The production is characterised by monocropping.

Farmers report many constraints in urban crop production: pests, limited knowledge on appropriate inputs, poor infrastructure, high rates for additional labour, lack of capital, limited access to land, and adverse climatic conditions such as excessive temperatures.

Levels of crop production in Cagayan de Oro are lower compared to the neighbouring rural provinces of Bukidnon and Misamis Oriental, which are situated in upland areas.
Backyard vegetable garden at Camilla Homes, Lumbia, Cagayan de Oro (Picture Periurban Vegetable Production Project).

The City Government encourages efforts of various agricultural stakeholders (Picture Periurban Vegetable Production Project).
Table 2: Agricultural production in Cagayan de Oro City\(^a\) and neighbouring provinces Misamis Oriental\(^b\) and Bukidnon\(^b\)

<table>
<thead>
<tr>
<th>CROP</th>
<th>Cagayan de Oro(^a)</th>
<th>Misamis Oriental(^b)</th>
<th>Bukidnon(^b)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Area (ha)</td>
<td>Volume (t)</td>
<td>Area (ha)</td>
</tr>
<tr>
<td>Maize</td>
<td>1,162</td>
<td>1,813</td>
<td>8,150</td>
</tr>
<tr>
<td>Rice</td>
<td>115</td>
<td>455</td>
<td>3,242</td>
</tr>
<tr>
<td>Coffee</td>
<td>65</td>
<td>39</td>
<td>5,988</td>
</tr>
<tr>
<td>Fruit</td>
<td>579</td>
<td>12,420</td>
<td>2,179</td>
</tr>
<tr>
<td>Root crops</td>
<td>304</td>
<td>2706</td>
<td>1,029</td>
</tr>
<tr>
<td>Vegetables</td>
<td>55</td>
<td>560</td>
<td>791</td>
</tr>
<tr>
<td>TOTAL</td>
<td>2,280</td>
<td>17,993</td>
<td>21,379</td>
</tr>
</tbody>
</table>

\(^a\) 1995; \(^b\) 1990

Source: City Agriculture Office; Department of Agriculture Region X, 1995.

2.1 Periurban vegetable production

Some farms specialise in commercial vegetable production. The average farm size is 1.7 ha and on average 0.5 ha is planted with vegetables. On 55 ha, or 2% of the cultivated area close to the city, vegetables were grown in 1995 (City Planning and Development Office 1995).

Most farmers grow eggplant, squash, string beans, tomatoes, bell pepper and bitter gourd. The yields of bell pepper, tomato and eggplant in Cagayan de Oro are less than half of those obtained in the upland areas (such as in Bukidnon). This indicates that the varieties grown are not well adapted to the climatic conditions in the lowlands. Findings of the Periurban Vegetable Project (PUVeP) survey among 100 vegetable farmers showed that, for 44% of the farmers, vegetable production is their only source of livelihood (Potutan 1998).

Of the vegetable farmers, 46% extract water from a river or stream, 20% from deep wells, 11% from irrigation canals and 12% depend entirely on rainfall. Eighty-six percent of the farmers reported that they applied chemical fertilisers; 82% actively controlled pests, diseases and weeds in the last three crops, of which 90% used insecticides, 36% fungicides, 4% herbicides and 50% natural control measures. Of those who applied synthetic pesticides, 49% personally encountered ill effects the last time they sprayed, including headache (55%), nausea (31%) and chest pain (14%).
Of farmers questioned, 24% had heard of the government Integrated Pest Management (IPM) programme and 12% of them had received training. The impact of IPM training was ambivalent, as 36% of farmers increased their level of pesticide use after receiving training, 36% maintained the same level of pesticide use and 73% just changed the commercial brand of their pesticides. Only 27% reported that they decreased the level of pesticide application and used less toxic chemicals after receiving IPM training.

Vegetable farmers mentioned more than 15 constraints to higher levels of vegetable production. The most frequently mentioned constraints are unfavourable climatic conditions (63%), insect damage (53%), lack of capital (53%) and irregular water supply (23%). Among other notable limitations to vegetable farming were the presence of plant diseases (7%), poor soil fertility (7%), poor water quality (5%) and a lack of access to marketing facilities (3%).

2.2 Livestock

The livestock - including poultry - industry in the city can be categorised into commercial and domestic production. In 1995, production reached 158,000 head, of which 135,000 were chickens (see Table 3). There is only one slaughterhouse in the city, which also caters for neighbouring towns. It is inadequate to cater to the needs of the growing population.

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Carabaos</td>
<td>1,593</td>
<td>1,609</td>
<td>1,367</td>
<td>1,411</td>
</tr>
<tr>
<td>Pigs</td>
<td>10,237</td>
<td>10,204</td>
<td>13,986</td>
<td>12,399</td>
</tr>
<tr>
<td>Goats</td>
<td>3,523</td>
<td>3,523</td>
<td>3,337</td>
<td>3,252</td>
</tr>
<tr>
<td>Cattle</td>
<td>4,570</td>
<td>4,581</td>
<td>5,245</td>
<td>4,010</td>
</tr>
<tr>
<td>Horses</td>
<td>453</td>
<td>462</td>
<td>424</td>
<td>409</td>
</tr>
<tr>
<td>Chickens</td>
<td>75,000</td>
<td>74,999</td>
<td>74,874</td>
<td>135,072</td>
</tr>
<tr>
<td>Ducks</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>1,350</td>
</tr>
<tr>
<td>Total</td>
<td>95,376</td>
<td>95,378</td>
<td>99,233</td>
<td>157,903</td>
</tr>
</tbody>
</table>

Source: City Veterinary Office.

Animals kept for home consumption are also slaughtered at home. No data have been recorded as to how much meat is produced by livestock reared at home.
2.3 Other types of urban agriculture

2.3.i Backyard gardening
Backyard gardening is common. The City Agriculture Office (CAO) estimates that about 40% of all households (94,672 in 1997) maintain backyard gardens. These produce mainly leafy vegetables, fruits and ornamental plants. The fact that this practice is common in both urban and periurban areas signifies its economic importance: families can save on food items, which they would otherwise have to buy. In addition, most households own domesticated animals.

2.3.ii School gardens
Ninety-six percent (75 out of 78) of public elementary schools in Cagayan de Oro maintain a school garden. This activity is pursued by pupils as part of the school curriculum and supervised by principals and teachers. The size allotted for gardens ranges from 500-1,000 m². The pupils usually plant leafy vegetables, fruits, ornamental and herbal plants. In some schools, parents are involved in maintaining and guarding these gardens. School administrators adopted bio-intensive gardening, designed for pupils to learn urban agriculture in both formal and informal education approaches.

2.3.iii Agroforestry
Some reforestation projects for the production of mahogany and other trees have been implemented in Cagayan de Oro, mostly on hilly land in the Lumbia, Malasag and San Simon barangays, about 10-15 km from the town centre. Some 30 subsistence farmers have acquired access to these government lands through their local leaders (barangay captains). They plant mainly vegetables and maize under the trees.

2.3.iv Aquaculture
As Cagayan de Oro is a coastal city, marine fishing is dominant. Six hundred full-time and 797 part-time fishermen provide about 70% of the demand for fish in the city (CAO estimate, 1998)

Aquaculture has not yet gained popularity among city farmers. This could be explained by the lack of knowledge about appropriate aquaculture systems, relatively high investment costs and the limited technical assistance. In light of the city's growth and the availability of brackish water, the government may give more attention to aquaculture development by providing adequate financial and technical assistance.
At the moment, 18 urban farmers (6 full-time and 12 part-time) engage in aquaculture, producing mainly tilapia, milkfish, and prawn/shrimp. The production is small-scale and market-oriented, in ponds of 3-6 ha in size. The average production of milkfish is 40 kg/ha.

2.3.v. Plant nurseries
Plant nurseries focus on the production of fruit-tree saplings or ornamental plants, mainly for parks and plazas. No concrete data related to the area coverage and the actual number of farmers engaged in this activity are available.

3. Food security, health and nutrition
In Cagayan de Oro, vegetables are considered a “poor man’s food” rather than a “luxury food”. There are two factors associated with this. Firstly, compared to meat and fish, vegetables are cheaper in the city. Secondly, vegetables are readily accessible, as they are widely grown in backyards, small farm lots and school gardens. Farming families, because of their low income, eat more fish and eggs than meat (Potutan 1998).

The estimated daily per capita consumption of vegetables is less than 75 grams, which is consistent with findings of similar surveys (Philippine Association of Nutrition 1997). This is far below the recommended daily human intake of 200 grams of vegetables necessary to assure sufficient vitamin and micronutrient supply (AVRDC 1996). Daily consumption of vegetables is highest among farmers (85%) and lowest among consumers in the higher socio-economic classes (64%). Respondents belonging to the higher class have by far the greatest meat consumption (78%); this was lowest among farmer respondents (7%). This suggests that, while urban farmers belong to the poorer economic classes, they have a healthier diet because of their farming.

There are differences between the crops available in the market and commonly consumed crops. This difference is attributed to home garden production (40% of the households do backyard gardening). In other words, a large proportion of consumers do not purchase all of their vegetables from the market.

A PUVeP survey among 302 pupils (average age 7.86 years and average weight 19.11 kg) found that 69% of the pupils are malnourished. Among the malnourished children, only very few belonged to households with backyard gardens. Numerous
children among the well-nourished group came from families who had backyard gardens and earned an adequate income from other sources (PUVeP 1998).

Some farmers’ practices pose risks to human health. Ninety-two percent of the respondents wear protective garments when administering pesticides. Often only partial protection is possible, as most farmers use an incomplete or inappropriate set of protective clothing (Potutan 1998).

4. Urban agriculture and the city environment

Daily, about 250 m$^3$ of city waste is disposed at the city sanitary landfill site in Barangay Carmen. It is estimated that about 60% of the waste materials are organic. This could be used for organic fertiliser production if appropriate technologies and management approaches were available.

A PUVeP survey (Potutan 1998) found that 25% of all respondents (periurban farmers) produced compost. The city government is presently cooperating with the PUVeP in collecting fruit and vegetable leftovers from the wholesale market in Agora, which are used for different experiments regarding composting technologies and compost application for certain vegetable cultivars.

Some of the periurban farmers are using government lands for crop production. For instance, a group of “eco-aides” petitioned the government to use unused areas of the landfill site for production. Not only do the farmers recycle organic waste by making compost of it, they also guard the area from illegal dumping and building. Other groups of farmers use the lands covered by reforestation projects by planting various crops under the trees. Since they are using government lands, they are responsible for guarding the seedlings/trees and keeping out scavenging animals.

5. Urban agriculture and the household economy

Traditionally, farming falls under the male domain, while women are responsible for household chores like cooking, cleaning and laundry. However, marketing of agricultural produce is mainly a women’s task: 73% of vendors of agricultural products are women (Arnado et al. 1998, Potutan et al. 1998). According to most vegetable vendors, on average they earn about 25% over their capital outlays.
The closest estimation on farmers’ earnings is the PUVeP survey, which found that net farmers’ earnings are on average about 30% of their production costs. Farmers spent a weekly average of 50 PhP on the purchase of vegetables, but all other respondent groups spent 100 PhP on the same. As farmers, on the other hand, consume more vegetables, this strongly indicates that farming significantly contributes to in-kind family income.

To both farmers and sellers, the seasonality of vegetable supply is an issue. Among the farmers, 30% reported occasional oversupply of vegetables during the harvest season; 20% said they had problems with regard to limited market display area, and 13% said that middlemen dictate vegetable prices. Among the wholesalers, 40% mentioned lack of supply of vegetables as their primary concern, 20% remarked on limited display area in their market, and 13% mentioned cheap wholesale prices. Among the retailers, 23% mentioned lack of vegetable supply, 22% limited display areas in the market and 21% lack of capital.

Small-scale food processing from urban agricultural production is promoted in the city with the City Agriculture Office (see below) taking the lead role. The products pursued are peanut butter, cashew nuts, banana chips, longaniza sausage, tocino ham, tablea chocolate, papaya pickles and camote candy. On average, each vendor dealing with small-scale food processing earns about 35% over total costs.

6. Policy perspective

In 1991 the Philippine Government signed the Republic Act No. 7160 known as the "Local Government Code”. This law stipulates the decentralisation of powers and resources from the national level to local government units (cities and municipalities). It broadens the margin of decision-making and the area of action of local institutions. Furthermore, decentralisation is seen as a measure with which to reduce migration and, thus, to avoid conflicts and congestion in urban centres. In this respect, the city of Cagayan de Oro is exercising its full powers in terms of devolved functions, including the delivery of agricultural services.

Shortly after the passage of the Local Government Code, the City Agriculture Office (CAO) was established. Since then, the CAO takes responsibility for all matters relating to urban agriculture. The CAO facilitates several agricultural activities in Cagayan de Oro including: a) agricultural extension services; b) Cagayan de Oro Greening Project; c) fisheries sector improvement; d) social
forestry sector improvement; e) Farming Youths Development Programme; f) home management extension services; and g) strengthening of farmers' co-operatives.

The objective of the agricultural extension services is to assist growers in farm management and to help farmers adopt appropriate farming technologies. Projects under this programme include Sloping Agricultural Land Technology, Farmers’ Field School (IPM), Barangay Nursery, Scion Grove Establishment and many more. The Cagayan de Oro Greening Project aims to promote planting around the city. Projects under this programme include park maintenance and seedling production. CAO extends assistance to improve the fishery and forestry sectors by strengthening fishermen and forestry co-operatives. The Department of Trade and Industry (DTI) in the city provides training in small-scale food processing of fruits and vegetables. The CAO also provides training on livelihood and income-generating projects among wives of farmers. Among these are swine and backyard cattle fattening, handicraft and soap-making, and low-cost recipes.

Through PUVeP initiatives, the City Government is now more aware of the importance of urban agriculture, but collaboration is mutual, as the City Economic Enterprise Department (CEED) has been supporting the project ever since it started. The CEED facilitates the provision of organic wastes from the markets to PUVeP as well as to urban and periurban farmers needing them.

The media such as local TV stations (e.g. ABS-CBN) and newspapers (e.g. Goldstar Daily and Sunstar) cover most of the PUVeP activities. These institutions are essential in promoting support for and creating awareness of urban agriculture among farmers and the public alike.

The City Government classified almost 50% of the city’s total land area as agricultural. Maximising the use of this area for better agricultural production will surely enhance the farmers' capability of managing small- and medium-sized farm enterprises.

The City Council passed several ordinances relating to urban agriculture. Most of these laws pertain to budgets and approval of CAO-sponsored projects, such as the Greening Project and the provision of agricultural extension services. A substantial part of city laws allows for the provision of strong opposition by the City Council towards undertakings that pose a threat to the environment.
For instance, City Ordinance No. 3031-94 opposes the construction of industries in Barangay Malasag’s reforestation area.

7. Factors affecting the development of urban agriculture

The support of the city government for urban agriculture is manifest in proposed legislation pertaining to home gardens, school gardens and access to government lands for periurban and urban farmers. But planning, policy initiatives and program monitoring are still limited and scattered. Policy-makers need to be more aware of the importance of integrating urban agriculture into urban planning and budgeting.

Two factors contributed to the city government's favourable response to the development of urban agriculture: firstly, the realisation of the potential of urban agriculture for enhancing food security (through research by Xavier University, PUVeP and other research institutes) and secondly, there is a critical mass of advocacy by farmer groups, and on behalf of farmer groups by NGOs, with respect to urban agriculture in order to create more income.

However, the success of integrating urban agriculture into general policy has been limited thus far. There is no general plan that brings together the different urban agriculture activities, and there is limited support extended to aquaculture, school gardens, and livestock, including poultry. Overall, the city is just in the initial stage of developing economically and ecologically sustainable agriculture.

Working methods and procedures regarding the planning and implementation of urban agriculture projects are not holistic, e.g. socio-economic status, cultural practices and existing development structures are not well considered. Through an integrated approach, areas of production, consumption and marketing of urban agriculture products must be equally assessed.

In the 1998 PUVeP study, several potential constraints were identified regarding the socio-economic interactions of periurban vegetable consumption, production and marketing in Cagayan de Oro. The reasons for low vegetable consumption are attributed to lack of information and educational campaigns (i.e., poor consumer guidance regarding the nutritional value of vegetables) and cultural dietary tastes. Possible reasons for low vegetable production are limited knowledge on appropriate inputs, poor infrastructure, high labour rates, limited access to land, climatic constraints such as high temperatures, attack from insect pests and lack of
capital. Vegetable marketing constraints may be attributed to poor policy formation and regulations, social aspects such as the involvement of middlemen, product varieties, standard operating practices and a lack of market display areas and capital.

To address these constraints, it is recommended that partnerships of all stakeholders in urban agriculture be strengthened. Already many NGOs have been assisting the development of urban agriculture in Cagayan de Oro by strengthening collaboration, most notably with local administrations and municipalities. However, to some extent, co-ordination between NGOs and local government is not well defined. Each of these institutions has different perspectives on how to implement agricultural activities.

8. Community participation activities

Activities at the local level are backed by a sustained flow of information through the media and by successful co-operation of NGOs and government. A network of NGOs called the Philippine Partnership for the Development of Human Resources in the Rural Areas (PHilDHRRA) is instituting tripartite partnership among People’s Organisations (POs), NGOs and Local Government Units (LGUs). The approach has been adopted among different farmer groups in the city (specifically, one assisted by the Mindanao Consortium for Agricultural Research and Rural Development - MinCARRD).

The tripartite approach has a clear process. First, an NGO will assist a farmer group (PO) in organising a co-operative. It deploys a community organiser to facilitate basic training in management, bookkeeping, marketing and gender sensitivity. Then the community organiser will train farmers in how to link with government agencies, such as the CAO, the Department of Agrarian Reform and the Department of Agriculture. After three years, the NGO will pull out from the community so that the farmers’ organisation is able to stand on its own. This approach proves to be effective in most communities, as it is comprehensive and integrated.
In conclusion, we feel that the prospects for the further development of urban agriculture in Cagayan de Oro are promising:

- farmers are interested to be trained and to apply better farming technologies to improve yields and the quality of their products and thus improve agricultural production;
- institutional support for urban agriculture is increasing on account of a) successful project showcases; b) tripartite partnerships between local government, NGOs and POs; c) collaboration between various agencies - a clear example is the CAO, which has been co-ordinating its activities closely with PUVeP as well as with NGOs in the city; and d) legislation in support of urban agriculture; and
- agroecological awareness of stakeholders is critical. An integrated approach improves information, planning and all other activities in the field of urban planning, food production and marketing. Networked information on specific technical and environmental issues stimulates people into further action and strengthens the awareness of decision-makers. Therefore, research and community action must be promoted.

1 The term "barangay" refers to the smallest local administration unit.
2 Cagayan de Oro has 57 periurban and 23 urban barangays. The term “periurban” in this study refers to barangays within the municipality, located at the periphery of the urban center. The city government classifies these still as rural barangays. These barangays are rapidly changing, particularly through the construction of industrial, commercial and residential complexes. Urban barangays are closest to the city centre. The population density is relatively high and some infrastructure is available (e.g. paved roads, telephone, public transport, education, hospitals, shopping malls, retail and wholesale markets, etc.).
3 So-called “eco-aides” collect waste like plastics, paper, glass and metal, and sell this. The earnings of a scavenger can be as high as PhP 500 per day (US$ 12) (personal comment, City General Public Services Office, 1998).
References


City Planning & Development Office. 1995. Socioeconomic Profile of Cagayan de Oro City. Cagayan de Oro City, Philippines: CPDO.


