A City-Wide Ecosan Concept for Cagayan de Oro, Philippines

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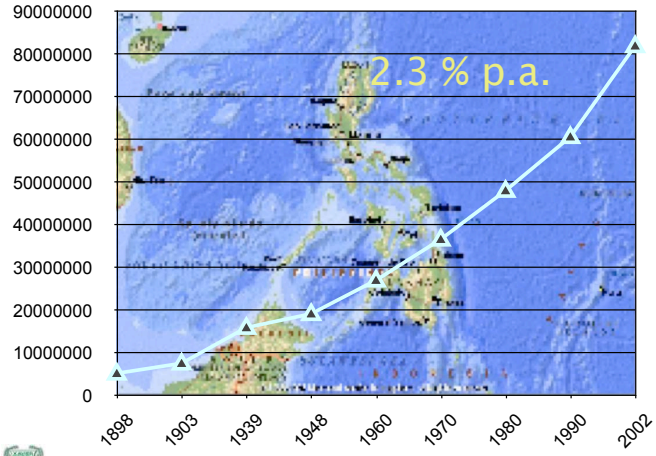
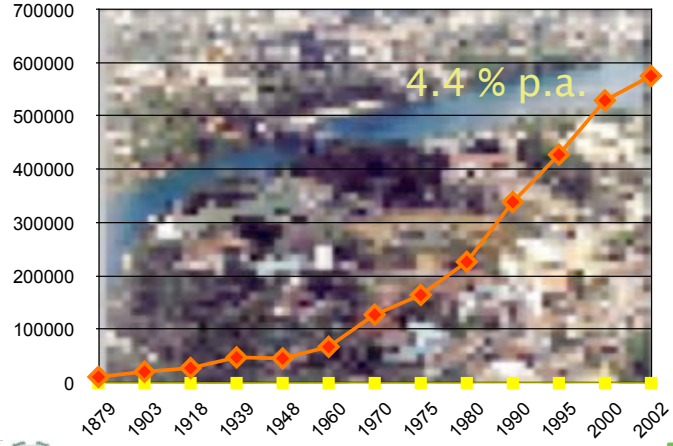
Background

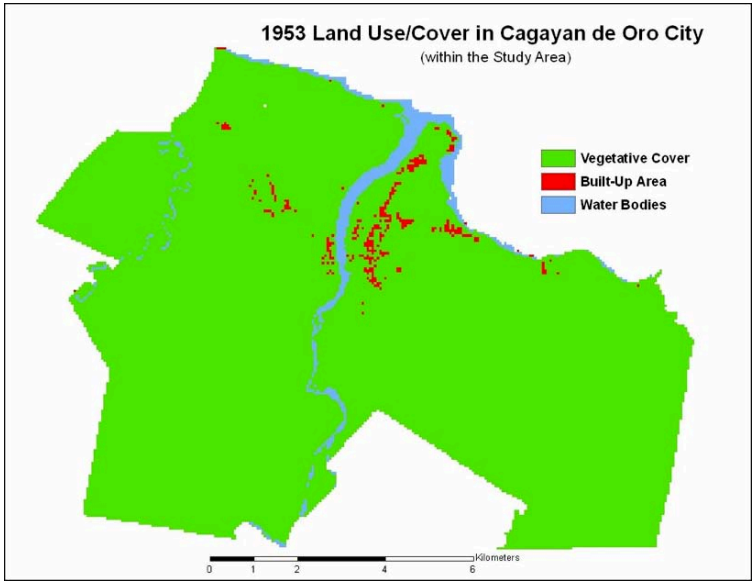


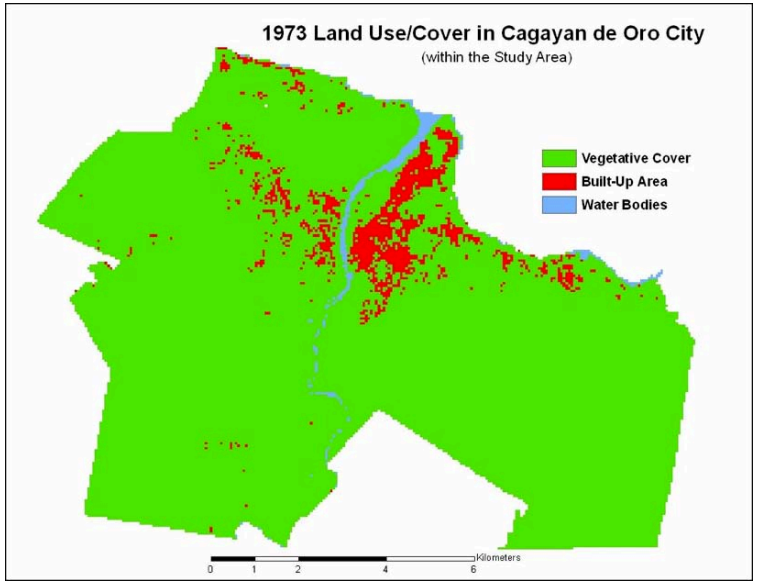
Population Growth of the Philippines (1898 to 2002)

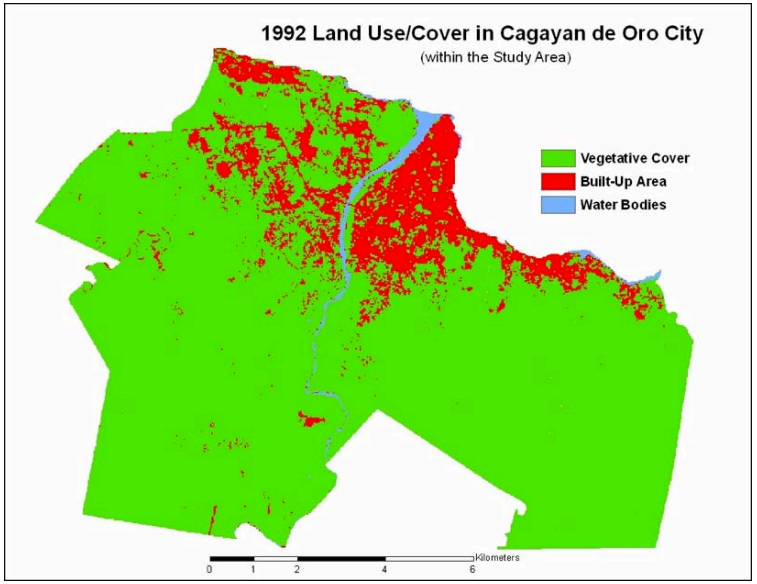
Background



Population Growth of Cagayan de Oro (1879 to 2000)




1973 Land Use/Cover in Cagayan de Oro City
(within the Study Area)
Vegetative Cover
Built-Up Area
Water Bodies
0 1 2 4 6
Kilometers


1992 Land Use/Cover in Cagayan de Oro City
(within the Study Area)
Vegetative Cover
Built-Up Area
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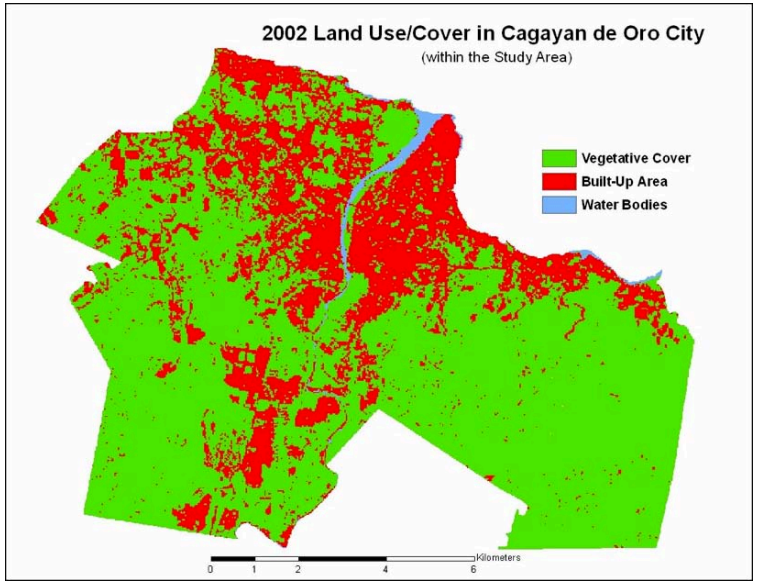
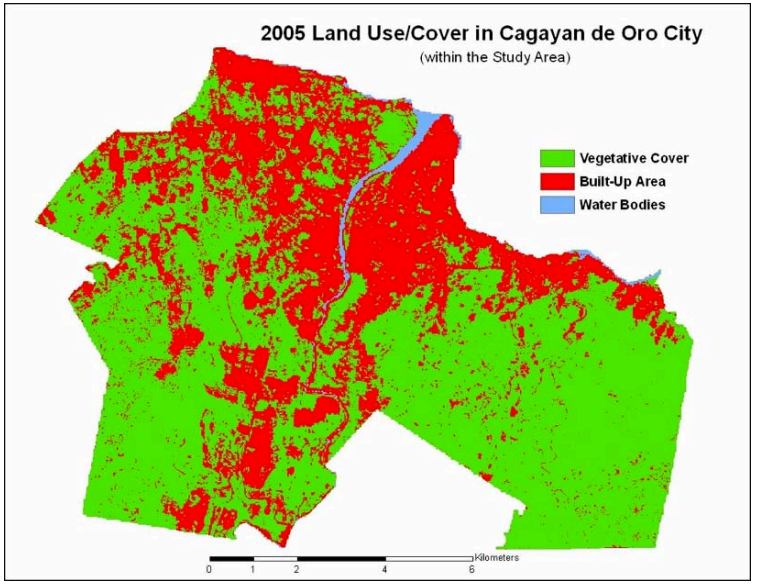
0 1 2 4 6
Kilometers


2002 Land Use/Cover in Cagayan de Oro City
(within the Study Area)
Vegetative Cover
Built-Up Area
Water Bodies
0 1 2 4 6
Kilometers


2005 Land Use/Cover in Cagayan de Oro City
(within the Study Area)
Vegetative Cover
Built-Up Area
Water Bodies
0 1 2 4 6
Kilometers

Major Challenges

- The average Filipino household spends 40 % of its income for food alone (~ 15 % Western countries)
  - The poorest sector of the Philippines, which comprises almost 40 % of all households, spends about 60 % of its available income on food alone[1].
- Malnutrition and chronic hunger are very common and present serious public health problems.
  - 20 % of Filipinos are suffering from hunger[2].
  - 27 % of children are underweight, 30% of children are suffering from iron deficiency anemia and 38% of children have deficient and low vitamin A levels[3].
- Average per capita vegetable consumption is low (36 kg per year)
  - FAO/WHO minimum requirement is 72 kg (Japan 150 kg)

[1] Philippine Association of Nutrition, [2]SWS Report December 2005,

[3]Annual Report of the Health and Nutrition Center of the Department of Education, 2002

Major Challenges

- Poverty related diseases[2]
  - more than half of the public school children suffer from parasitism (such as lice and intestinal worms)
  - more than 40% suffer from skin diseases such as infected mosquito bites and scabies.
- Root causes
  - lack of water and appropriate sanitation facilities at home as well as in the schools
  - crowed living conditions in the families
  - overcrowded classrooms
  - lack of awareness concerning the importance of hygiene
  - unhealthy and insufficient food intake

[2] Annual Report of the Health and Nutrition Center of the Department of Education, 2002

Symptoms of hygiene-deficiency related diseases

Strategies

- New strategies based on prevention and health promotion within the WHO frameworks “**Healthy Cities**” and “**Health Promoting Schools**” have been introduced to five urban poor communities and two elementary schools in Cagayan de Oro.
- Underlying principle:
  - the community and the schools have to become healthy places under active participation of non-health professionals such as teachers, parents, local government officials and community members.

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Strategies vs MDGs

1 ERADICATE EXTREME POVERTY AND HUNGER

… by implementing urban agricultural activities in schools and urban poor communities.

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Strategies vs MDGs

2 ACHIEVE UNIVERSAL PRIMARY EDUCATION

… by focusing on the fact that children need to be healthy to attend school and benefit from education.

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Strategies vs MDGs

3 PROMOTE GENDER EQUALITY AND EMPOWER WOMEN

… by focusing on traditional women centered fields of activities such as nutrition, health, and waste recycling.

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Strategies vs MDGs

MDG 4: Reduce child mortality, *by taking actions to reduce the main risks to health, namely insufficient hygiene and nutrition.*

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Strategies vs MDGs

MDG 5: Improve maternal health, *by taking actions based on forming healthy habits.*

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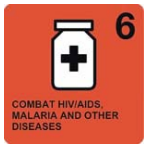
Strategies vs MDGs



MDG 6: Combat HIV/AIDS, malaria and **other major diseases,** *by addressing the actions towards diseases most prevalent in the Philippines, such as malnutrition and all hygiene deficiency related diseases.*

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Strategies vs MDGs

MDG 7: Ensure environmental sustainability, *by actions based on proven concepts of integrated solid waste management and ecological sanitation..*

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Strategies vs MDGs

8 GLOBAL PARTNERSHIP FOR DEVELOPMENT

MDG 8: Develop a global partnership for development
by enabling exchange and dialogue between governmental, academic, private and civil society organizations in Germany, Philippines, and other South and Southeast Asian partners

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Allotment Gardens

- Community gardens are defined as gardens where people **share** the basic resources of **land, water**, and **sunlight**. This definition includes both allotment and common gardens.
  - **Allotment gardens**: the parcels are cultivated individually
  - **Common gardens**: the overall area is tended collectively by a group of people

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Allotment Garden in UK, Germany and Switzerland

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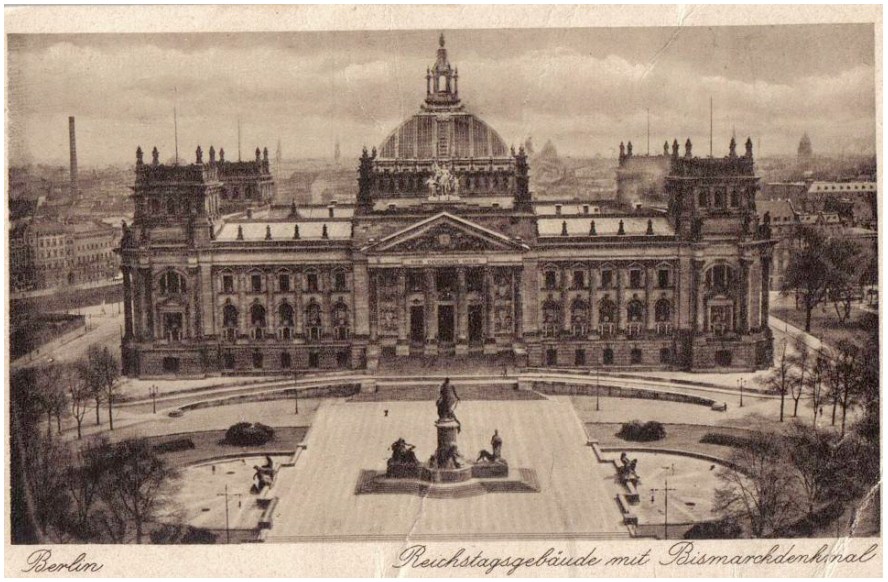

Reichstag, Berlin (around 1900)

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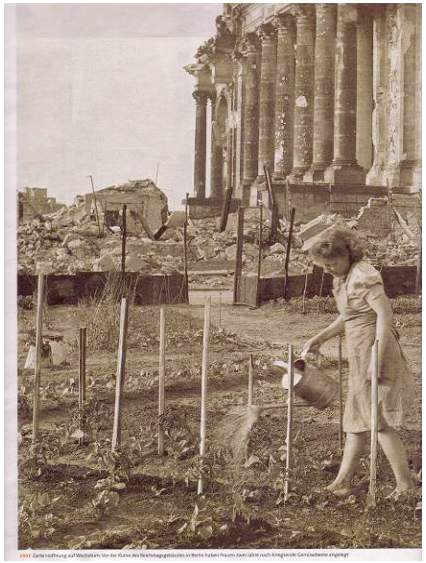
Reichstag, Berlin (April 1945)

Reichstag, Berlin (spring 1946)



Reichstag, Berlin (spring 1946)

Reichstag building, Berlin (2006)

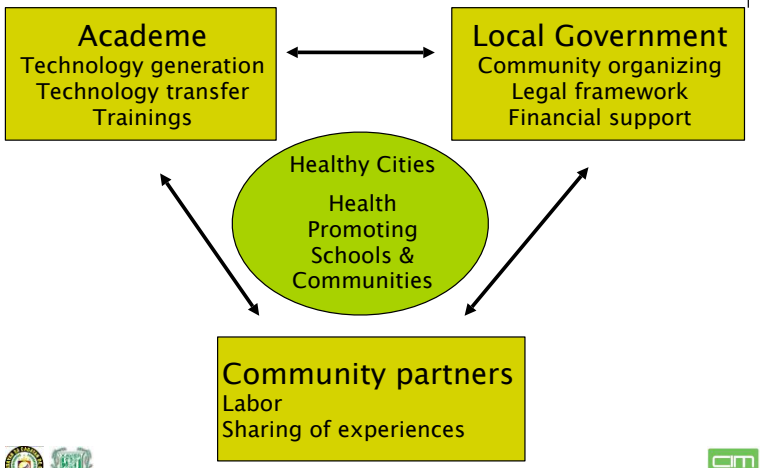
Cagayan de Oro Gardens

- Seven areas in the city made legally available to 99 urban poor families for production of crops
  - Two of them are located within the premises of public elementary schools
- Joint effort of academe, LGU and community
- Integrates aspects of solid waste management, ecological sanitation, participatory land use planning and community organizing

Methodology

- Asset-Based Community Development (ABCD Approach)
  - Not focused on problems, but on assets and resources of the community
  - Mapping of the community's internal and external resources, planning for development and follow-up processes:
    - Urban Poor
      - They have knowledge and skills, but not harnessed
    - Vacant Lots
      - owners fear squatters, stays idle and unproductive
    - Knowledge
      - Knowledge on crop production, ecosan, composting etc. is kept in books and academic circles, is not made used of
    - Biodegradable solid and liquid wastes
      - waste can be defined as a "misplaced resource"
      - but put into the right place and used with appropriate technology it suddenly becomes a valuable resource (nutrients and soil amendment for crop production)

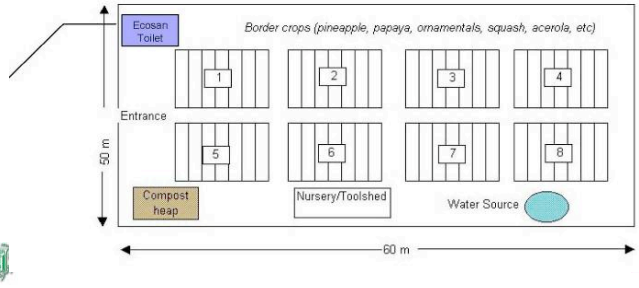
Methodology



Methodology

Pilot Allotment Garden

- Minimum of 8 individual allotment units with 288 m^2 each (gross 3000 m^2)
- Area is fenced, with entrance, bodega and water supply
- Surrounding areas can be planted with border crops
- Contains a compost heap for biodegradable household wastes and urine-diverting dry ecosan toilet



Methodology

Ecosan Toilet Establishment

- Ecosan training of one staff member in Sweden (August 2004)
  - Experimental segregation of urine and application to sweet corn (September 2004 to January 2005) at Manresa Farm
- Information sharing with city government and local communities (March 2005)
- Project proposal to German Embassy (April 2005)
- Linkage with GTZ Water & Sanitation Program (June 2005)

Methodology

Collection of urine – Materials used

The humble starts of Ecosan in 2004

Methodology

Ecosan Toilet Establishment

Construction of Ecosan Toilets in 2005

Methodology

Ecosan Toilet Establishment

Inauguration of Ecosan Toilets in presence of city officials and representatives of the German Technical Cooperation

Methodology

Reuse of Ecosan Products

Transportation of urine container

Urine application through drip irrigation system

Application of urine through furrowing

Methodology

Reuse of Ecosan Products

Sweetcorn applied with urine

Yield increases up to 30 %

Larger cobs (3-4 cobs/kg compared to 5-6 cobs/kg)

Results

Socioeconomic Profile:

Characteristics	% Gardeners	% Non-Gardeners
Monthly Household Income (PhP)		
below 3,000	88	12
3,001 -4,000	12	75
4,001 -5,000	0	13
More than 5000	0	0
Monthly Savings (PhP)		
below 200	81	19
201 -400	19	19
No savings	0	62

Results

Allocation of Vegetables produced in Allotment Gardens:

Allocation of Vegetables	%
Sold	68
Own consumption	25
Given away to friends/relatives	6
Place where vegetables are sold	**%**
At the garden	94
In the neighborhood	9
In the market	0

Results

Vegetable Consumption Levels:

Consumption level of vegetables after Allotment Garden has been established	**%**
Increased	94
Same level	6
Percentage of increase in consumption level	
50%	13
75%	6
100%	75
No comment	6
How would be your vegetable consumption level if the AGP will stop its operation?	
Will consume the same amount	19
Will consume less	81

Results

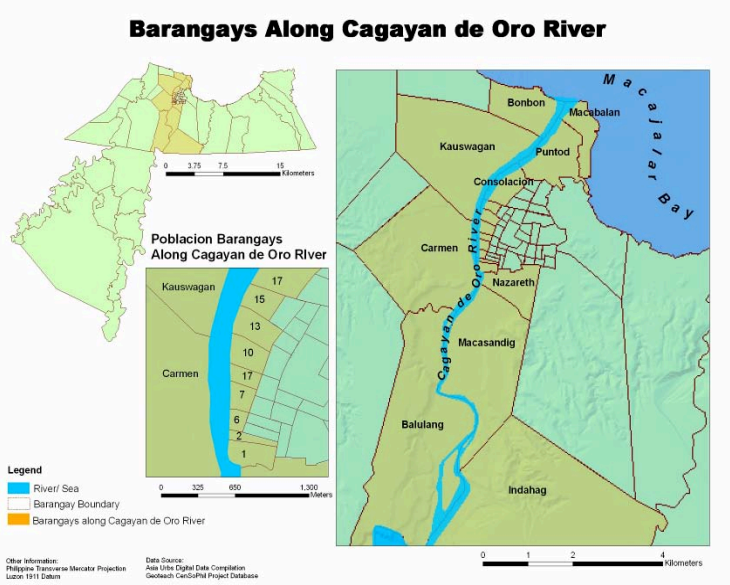
Perception towards reuse of Ecosan products (prior to implementation):

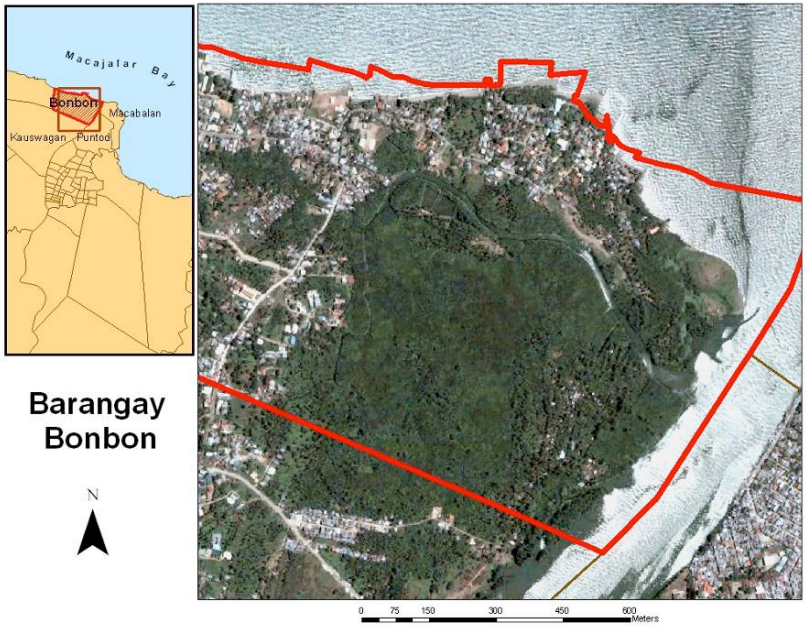
Willingness to eat vegetables fertilized w/urine	Gardeners (%)	Non-gardeners (%)
Yes	92	56
No	8	44
Willingness to eat vegetables fertilized w/ faeces		
Yes	92	62
No	8	38

Vision

and next steps for a city-wide ecosan application

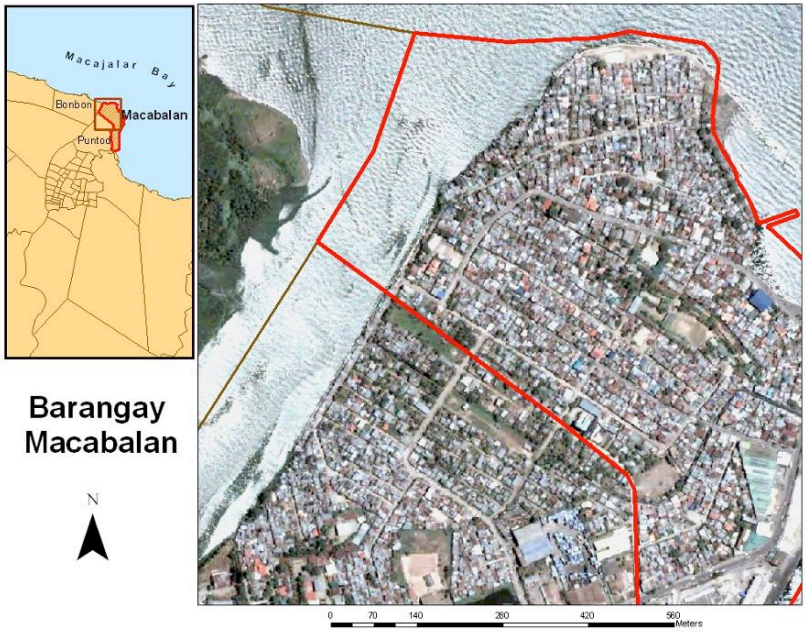
- Further gardens with ecosan toilets will be established in 2007
  - Project of the city in cooperation with UN-Habitat, DILG and League of Cities of the Philippines
  - Incoming city ordinance to promote allotment gardening
- Establishment of ecosan toilets along the Cagayan de Oro River





Barangay Bonbon

N



Barangay Macabalan

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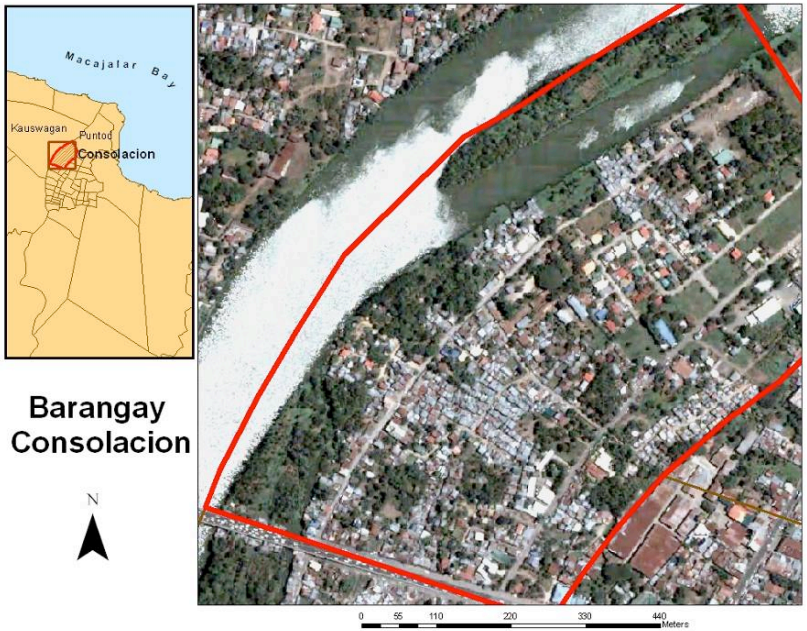

Barangay Consolacion

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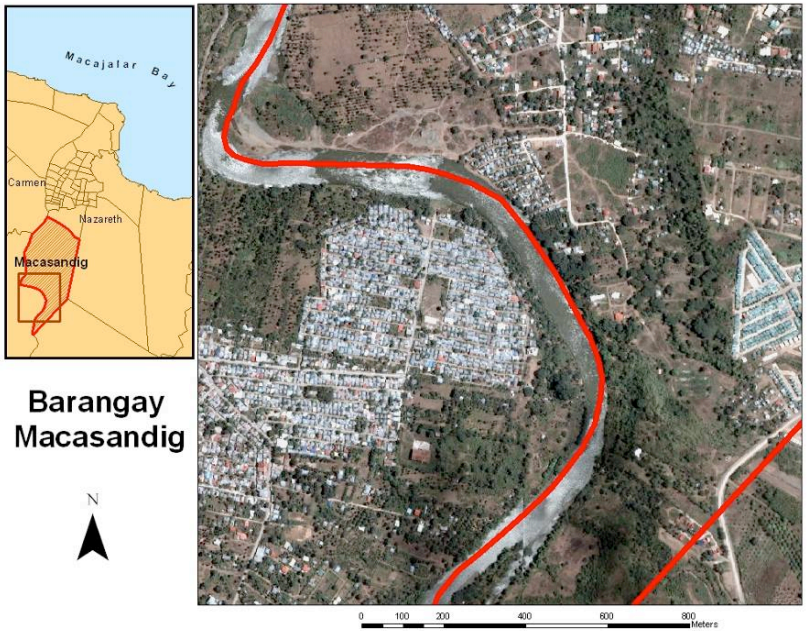

Barangay Macasandig

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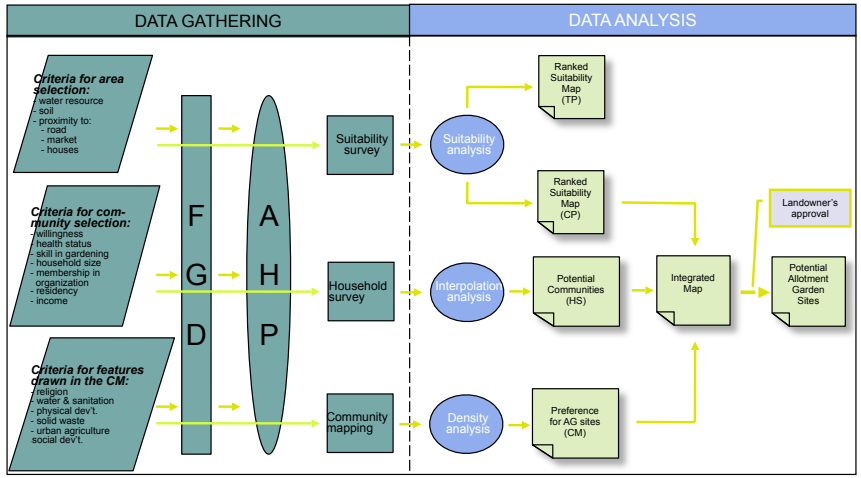
Identification of AG sites using GIS



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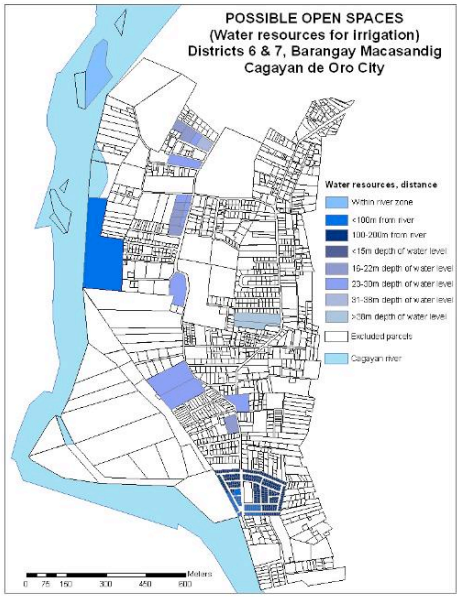

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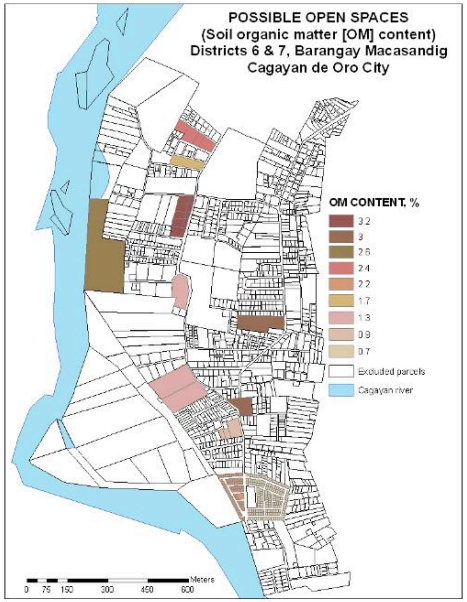

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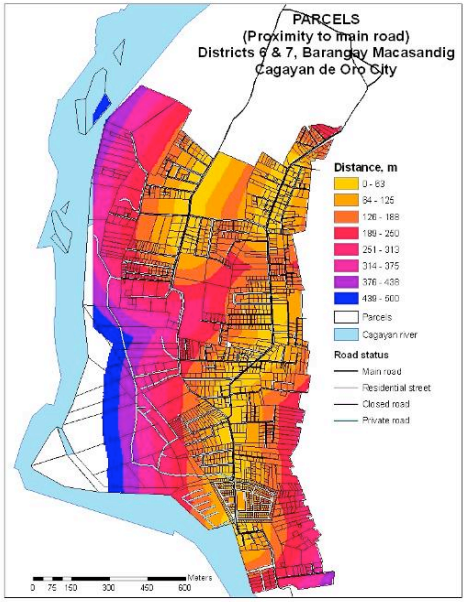

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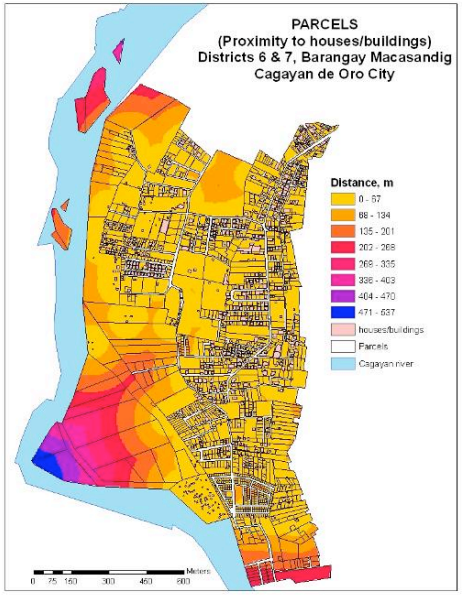
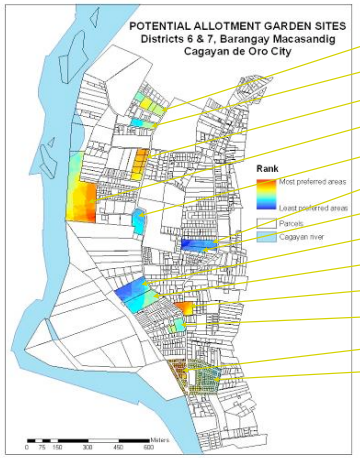


Result:



Site #	# of parcel	Total area (m^2)	Actual use/cover
1	4	7,612.803	Open space
2	1	4,222.209	Open space
3	9	8,738.735	Open space
4	1	37,778.952	Scrub w/ open space
5	1	6,394.582	Scrub w/ open space
6	1	5,977.638	Cocos w/ open space
7	1	3,449.900	Cocos w/ open space
8	1	11,822.609	Open space
9	1	10,215.643	Open space
10	1	4,378.386	Open space
11	3	4,449.672	Open space
12	75	6,869.439	Open space
13	169	14,453.120	Open space

LINEAR COMBINATION

$X = P_1*50 + P_2*25 + P_3*25$

where: X – Potential allotment garden sites
P_1 – Ranked suitability map (community perspective)
P_2 – Map of potential communities
P_3 – Map of preferred allotment garden sites

Vision

and next steps for a city-wide ecosan application

- Establishments of ecosan toilets for different eco-tourism projects, particularly
  - At the entry and exit points of the Cagayan de Oro White Water Rafting
  - Macahambus Adventure Park

Vision

and next steps for a city-wide ecosan application

- Neighboring municipalities of Opol (coastal area) and Manolo Fortich (rural – mountainous) requested support for ecosan
  - Plan to establish 20 ecosan toilets in 2007
- Ongoing researches
  - Use of diluted urine for food and non-food crops (October 06 to January 07)
  - The effect of vermicomposting on presence of helminth ova in human faeces (November 06 to February 07)

Actual vermicomposting of organic wastes in Manresa (XU Farm)

Vision

and next steps for a city-wide ecosan application

- Implementing German Best Practices
  - Ongoing negotiation of city government with German company as regards landfill rehabilitation and integrated solid waste management under KfW program
  - Interest of city to adopt constructed wetland system as established in Bayawan City (Central Philippines)
  - Dewats System for Slaughterhouse and Hospitals

Vision

and next steps for a city-wide ecosan application

- **Concept**

  solid removal in clustered septic tanks

  1 vertical-flow reed bed & 1 horizontal-flow reed bed, 2.650 sqm in total

  reuse of treated waste water for construction and irrigation of public planted areas
- **Project Scale**

  resettlement area for slum dwellers: 715 households on 7.4 hectares
- **Project Cost**

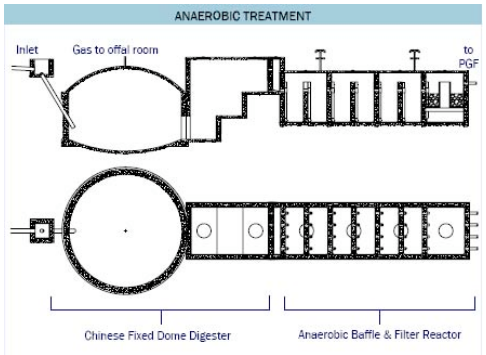
  Construction 10 Mio PHP (= 2,600 PHP / household)

Constructed Wetland for Resettlement Area, Bayawan City (Philippines)

Vision

and next steps for a city-wide ecosan application

View of anaerobic treatment; digester, anaerobic baffled reactor (ABR), and anaerobic filter (AF). Gas produced from digester is piped to offal room.



Dewats System for Slaughterhouse,Valenzuela City (Philippines)

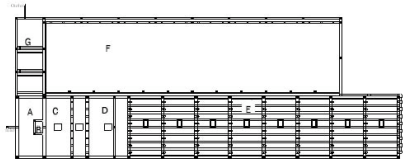
Vision

and next steps for a city-wide ecosan application

View onto the waste water treatment plant Kasih Ibo Hospital

Technical Layout

A. Pump Pit
B. Inlet
C. Sedimentation Tank
D. Sedimentation Tank
E. Anaerobic Filter
F. Horizontal Gravel Filter
G. Aerobic Ponds



Dewats System for Hospital Indonesia

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