



and Alcoa Foundation

# Integrated Waste Management Program for Ordinary Solid Waste in Rural Communities of Central America and the Caribbean

## **Results of Research at Nosara, Guanacaste**

by Natalia Vega Araya

# Presentation Itinerary:

## About Nosara

### Current waste management at Nosara

- Position of the Municipalidad de Nicoya
- Waste recolection system
- Dump
- Positive Projects

### Solid Waste Analisis Protocol

- Generation and Composition of Garbage

### Voluntary Plan for Nosara's Waste Management

- Legal background
- Objectives
- Strategies for improvement

### Questions and Refreshments

# NOSARA

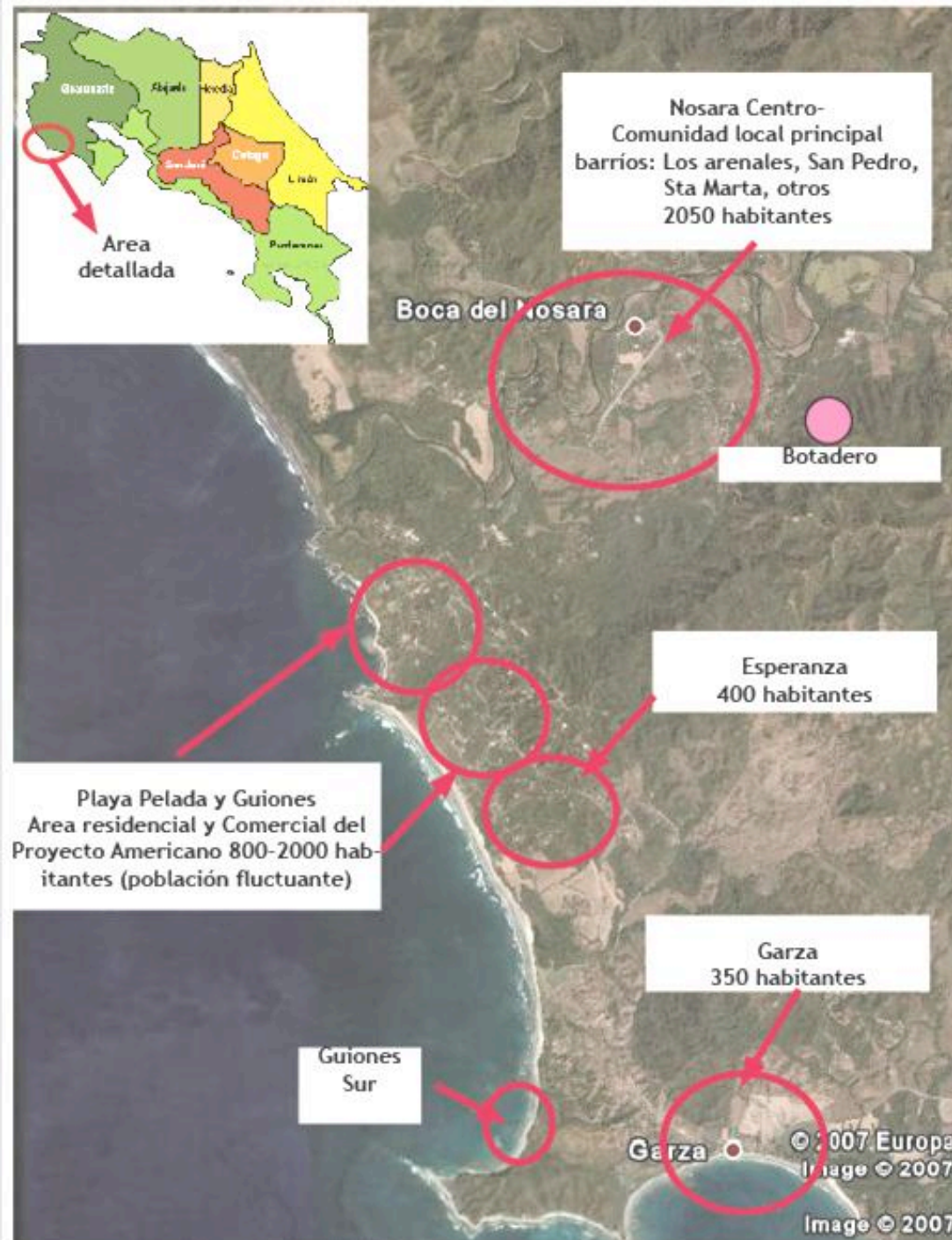
- Coastal community in Guanacaste
- Economy based on: TOURISM
- Agriculture almost non existent.
- 3600 people.
- High season 5000 people.
- Well marked dry and rainy season



# Inhabitants

Place	# households	# people	persons / house
Nosara Centro	490	1600	3,3
Sta Teresa	19	77	4,1
Sta. Marta	79	303	3,8
Esperanza	92	384	4,2
Los Ángeles	15	65	4,3
Garza	54	187	3,5
Delicias	42	153	3,6
P. Americano	300	800	2,7
<b>Total</b>	<b>1091</b>	<b>3569</b>	<b>3,7</b>

**Very Low density 61,5 persons per km2**



Disperse  
distribution of  
people

25% are resident  
foreigners

there are 2  
areas  
geographically  
and culturally  
defined





Playas de Nosara



Botadero de Nosara



Camino  
hacia  
Nosara



Muestra  
de basura



Único camión  
recolector  
de Nosara

# Current waste management at Nosara

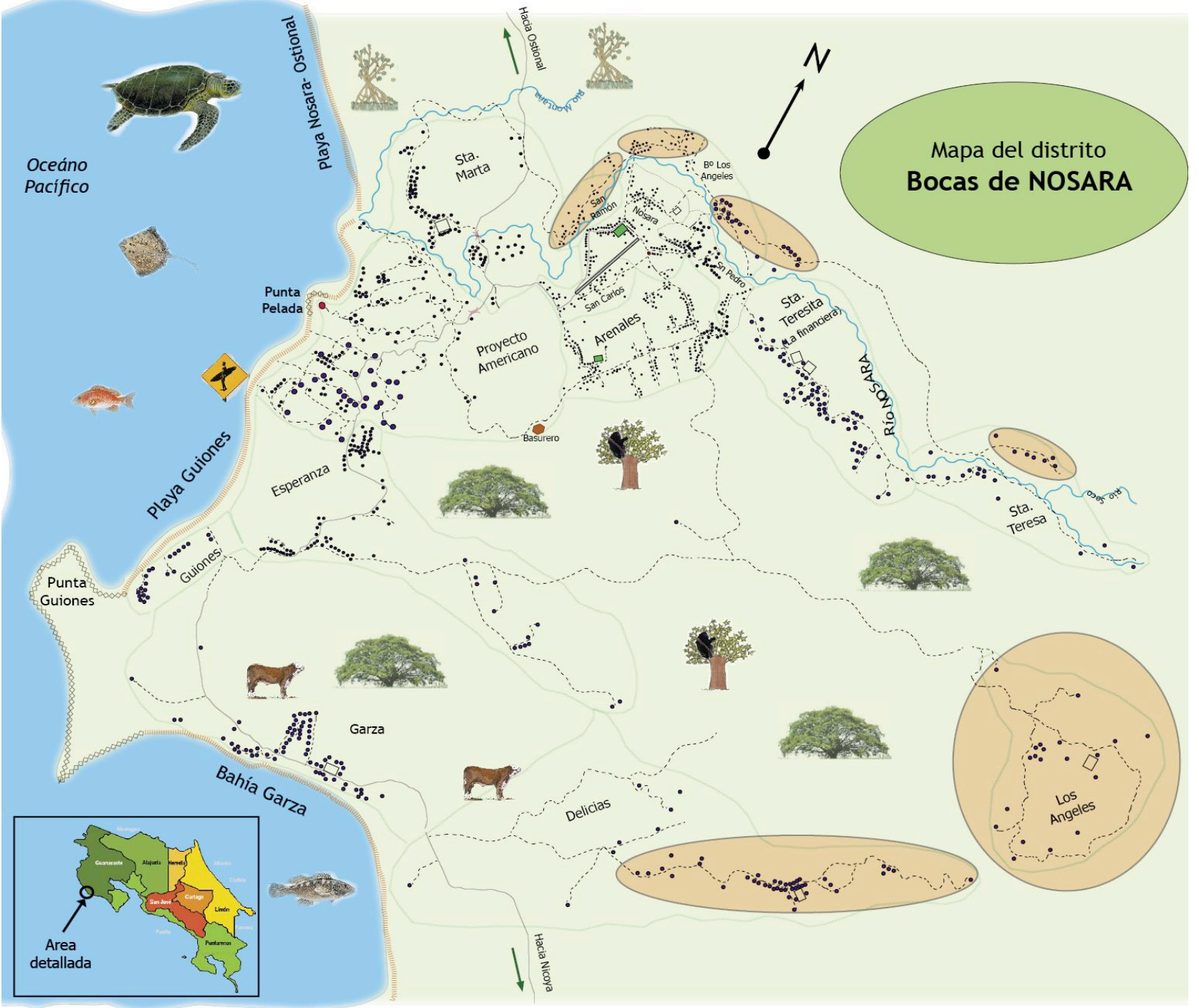
# Municipalidad de Nicoya

- They have a “Waste management action plan” for the urban population:
  - Focus on environmental education.
- Budget for Recycling Centre (2008)
- Transformation of Nicoya´s Dump into a Manual Landfill.
- They have NO plan of waste management service for Nosara in the short -medium term.

# **Waste collection service by MICROSAN**

- Many people do NOT pay their garbage bill.
- Workers have bad working conditions and long working days on high season.
- Very dirty road to the Dump.
- Gives service to only 70% of Nosara.
- Places that do not receive the service at all:
  - Delicias, Los Angeles, the other side of Nosara River
- Dirty rivers and Garbage burning!.





# Problems during garbage collection

- Bad roads and floods
- Absence of appropriate garbage bins
- “Estañones” without drainage
- Garbage outside of bags







# Garbage Burning

- 65% of the households give some extra treatment to their garbage.

Additional Management	PA	LOCAL	Average
BURN	20%	64%	42%
Compost/ soil/ animals	60%	20%	40%
Throw into river /empty lots	0%	7%	3%
Recycles	20%	10%	15%



# DUMP

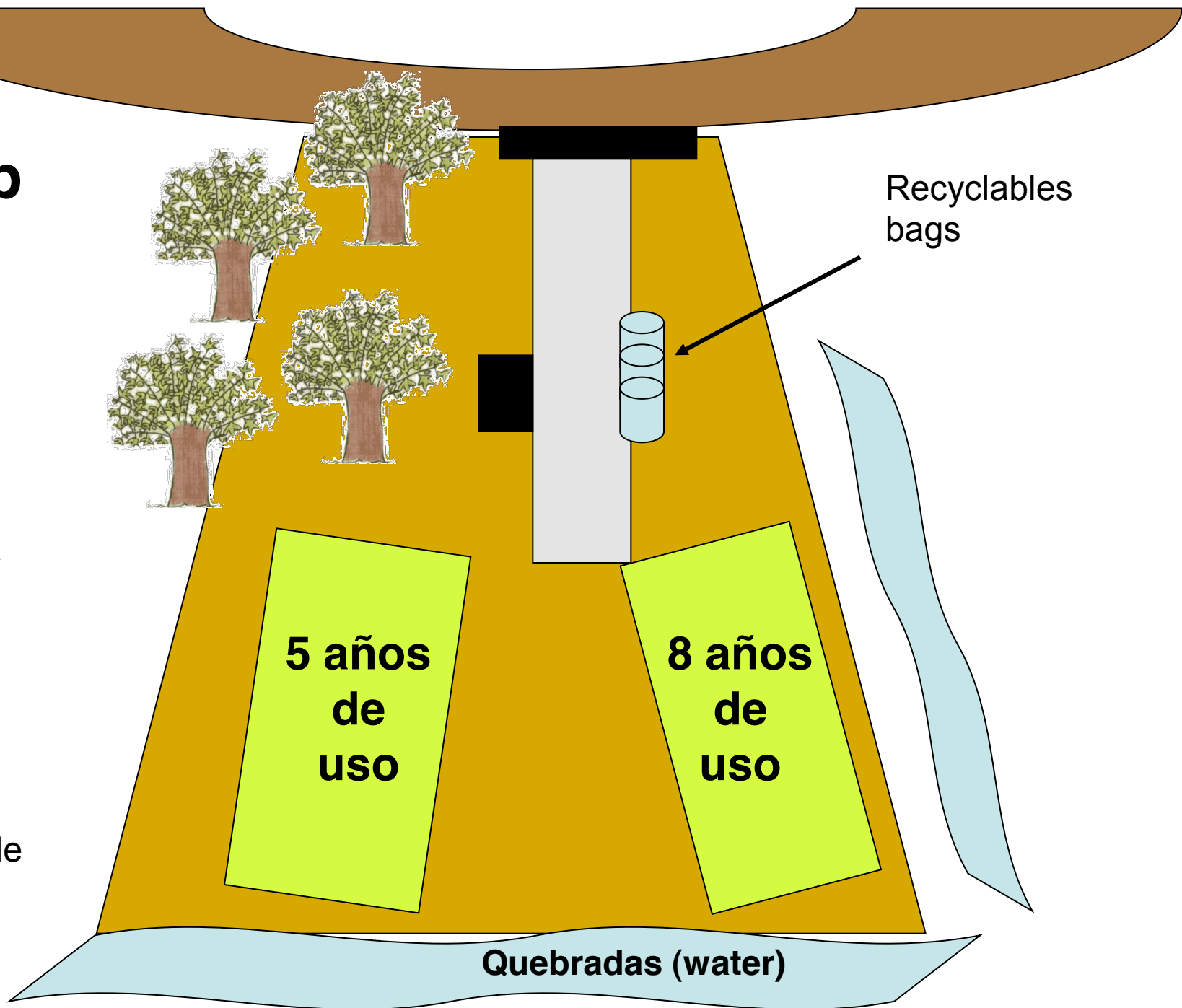


# Dump Map

Area:  
1 hectare

Total Area  
130 ha

Owners:  
Asoc.  
Amigos de  
Nosara



Recyclables  
bags

**5 años  
de  
uso**

**8 años  
de  
uso**

**Quebradas (water)**



# Estate of the Dump

- Overfilled - another trench is required.
- No garbage crushing (volume reducing)
- Possible groundwater pollution
- No garbage covering.
- No water / No electricity
- NO security people
- No information / schedules



# THE REAL PROBLEM

*Garbage is a consequence on our lifestyle and that tells us that is something wrong with it: we are the only species that produce garbage. Our lifestyle reflects our thoughts, so what we require is a collective mental change from the designers and the consumers.*

Per capita garbage production in Nosara (0,91 kg per day) is higher than the national average ( 0,8 per day).



Bandera Azul Ecológica - Playa Guiones  
 La Naturaleza no sabe que hacer con la basura  
 Ayúdenos a Reciclar.  
 Nature does not know what to do with trash  
 Help us recycle

Nosara tiene  
 Bandera Azul Ecológica

### Clasificación de Basura

			
PLASTICO	PAPEL	METAL	VIDRIO
			
COMIDA ORGANICA	COMIDA COCINADA	BATERIAS	CARTUCHOS

Reciclaje-Hotel Harmony

ESTAMOS RECICLANDO: ALUMINIO  
 PLASTICO  
 VIDRIO  
 Coloque la basura en el recipiente CORRECTO  
 No se aceptan refrigeradoras, cocinas, zinc,  
 escombros, ventiladores  
 No Mezclar

Minicentro de acopio  
 en Guiones Sur



Reciclaje-  
 Café París



Reciclaje en el botadero



Some very  
 positives  
 points for  
 Nosara





There is **RECYCLING** at the dump. We have to make the separation process easier and more efficient!



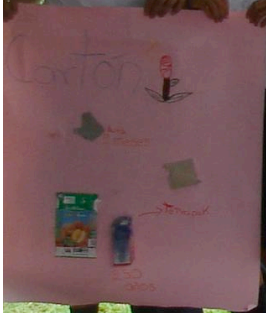


# Aware education centers

- Harmony hotel has support several workshops related to environmental education on waste





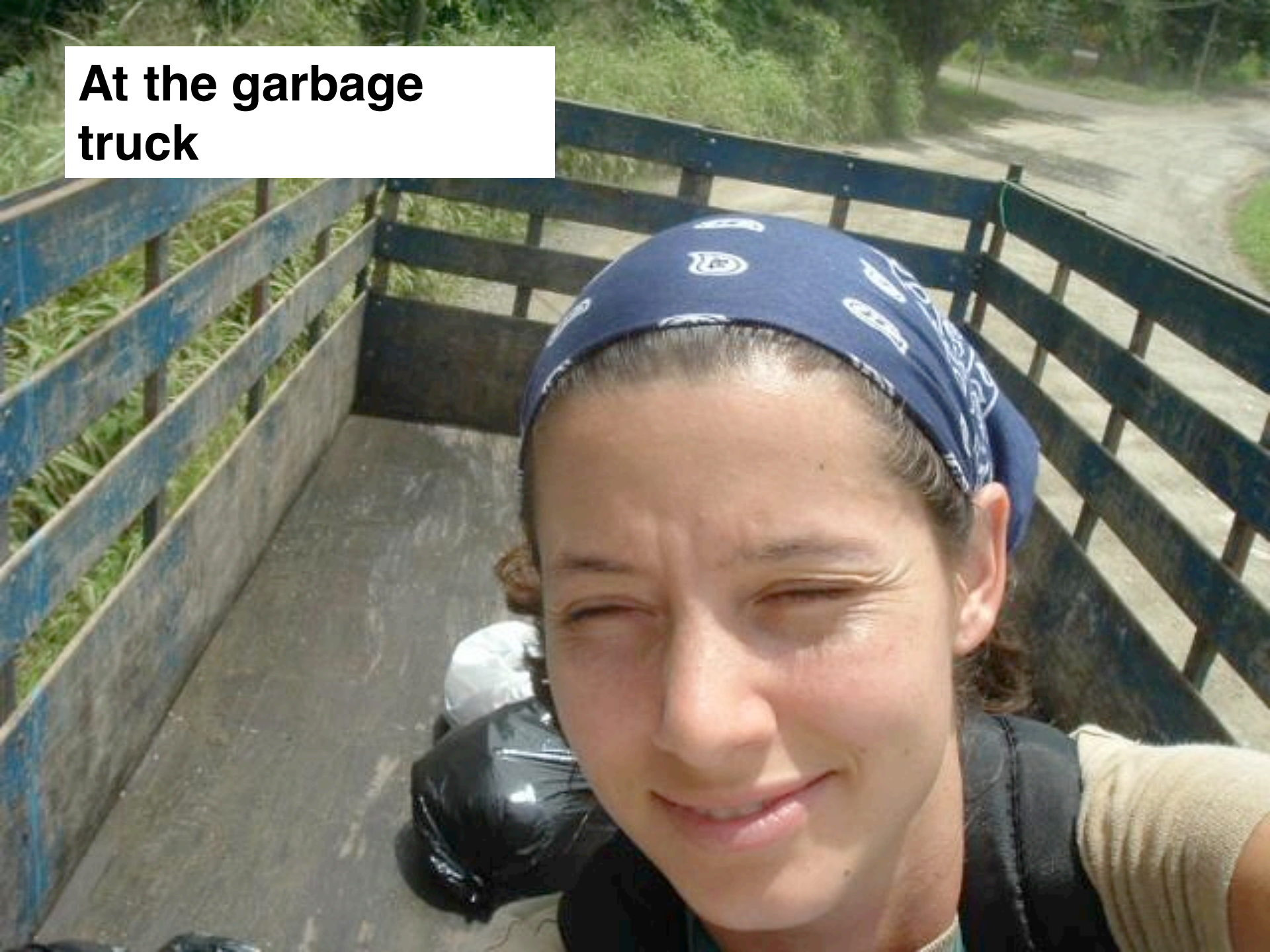




# **SOLID WASTE ANALYSIS PROTOCOL NOSARA**

- Total garbage weight per area.
- Visual classification on garbage
- Sampling at the source to determine composition
  - 4 different sampling spots
    - Local houses (Nosara, Esperanza, Garza, Sta. Marta)
    - American Project houses
    - Hotels
    - Other business

**At the garbage  
truck**





# Sampling at the source





**María Ester-  
Helping  
during the  
sampling**

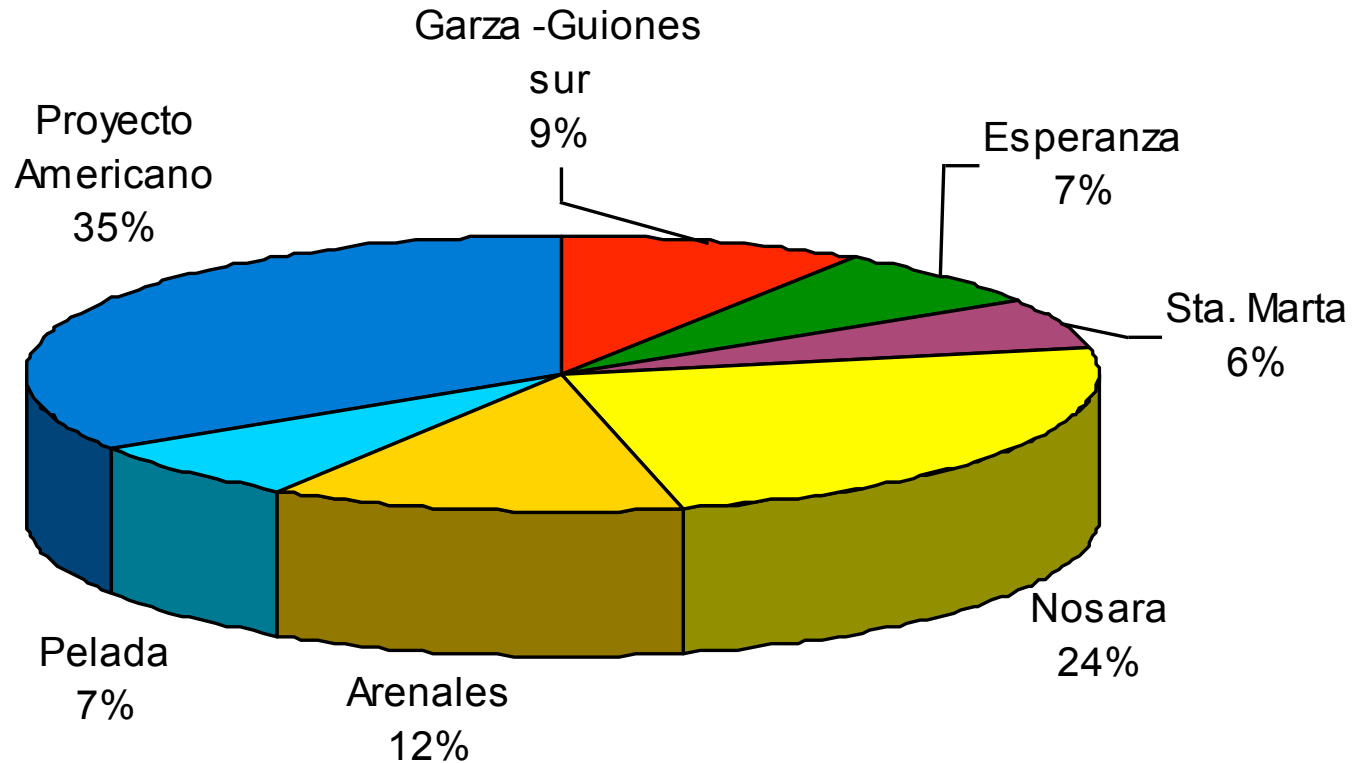




# Nosara Waste Stream

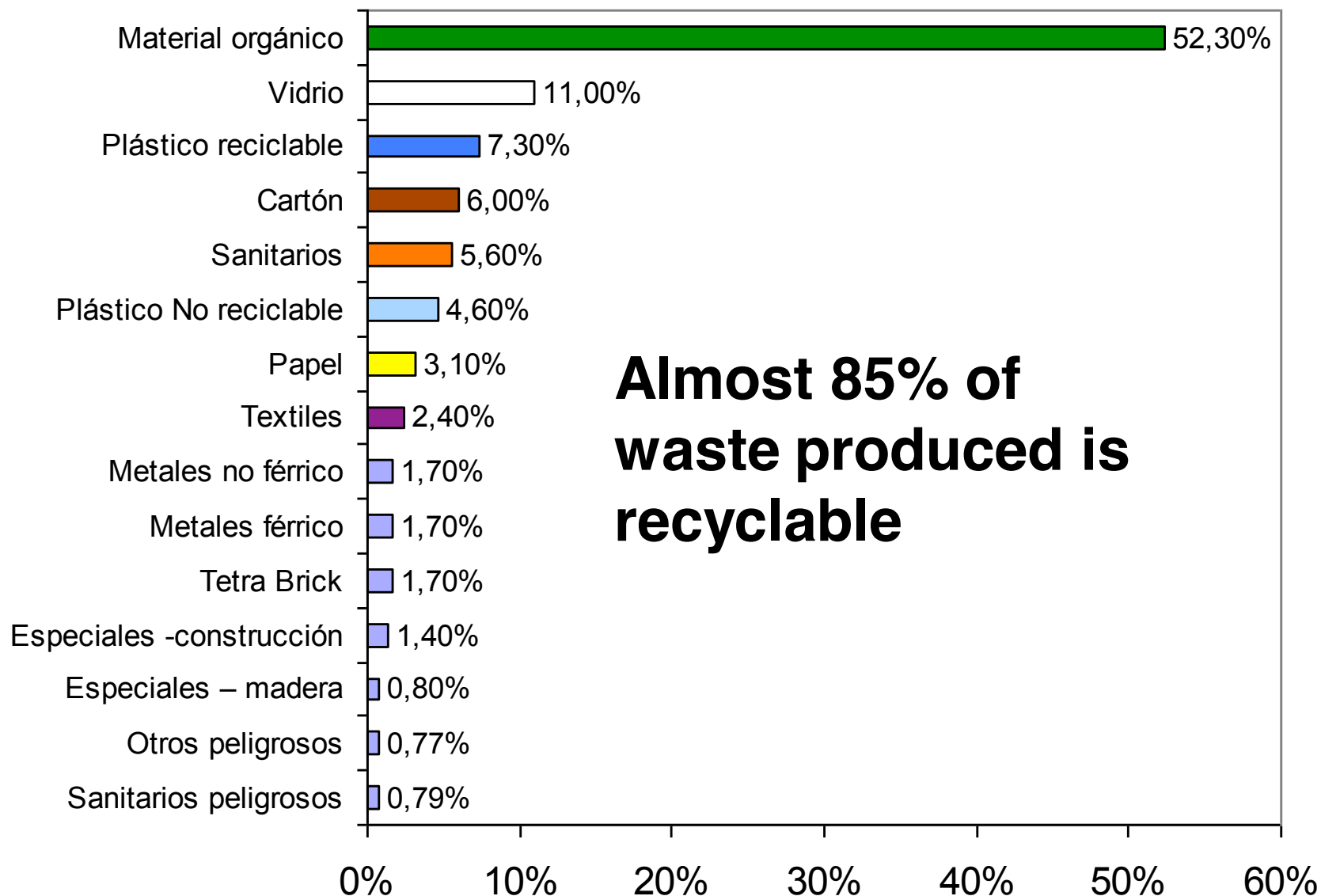
	LOW SEASON	HIGH SEASON
Length of the season (months)	7	5
Number of truck trips per day	2	3 a 4
Number of truck trips per week	8	12
Truck capacity m3	22,3	
Garbage density (kg/m3)	100	
Amount of garbage load (kg) per trip	2230	
Kg of extra garbage per day (other trucks)	500	1000
Weekly garbage production in tons	21,4	33,8
<b>Daily garbage production ( tons)</b>	<b>3</b>	<b>4,8</b>
Amount of people in Nosara	3750	4750
<b>Per cápita daily garbage production (kg)</b>	<b>0,81</b>	<b>1,02</b>
Average per capita garbage production (kg)	0,91	
Monthly production (tons)	92,68	146,61
Production of garbage per season (tons)	648,74	733,07
<b>Annual production (tons per year)</b>	<b>1382</b>	

## % of Garbage Production per Area, Nosara



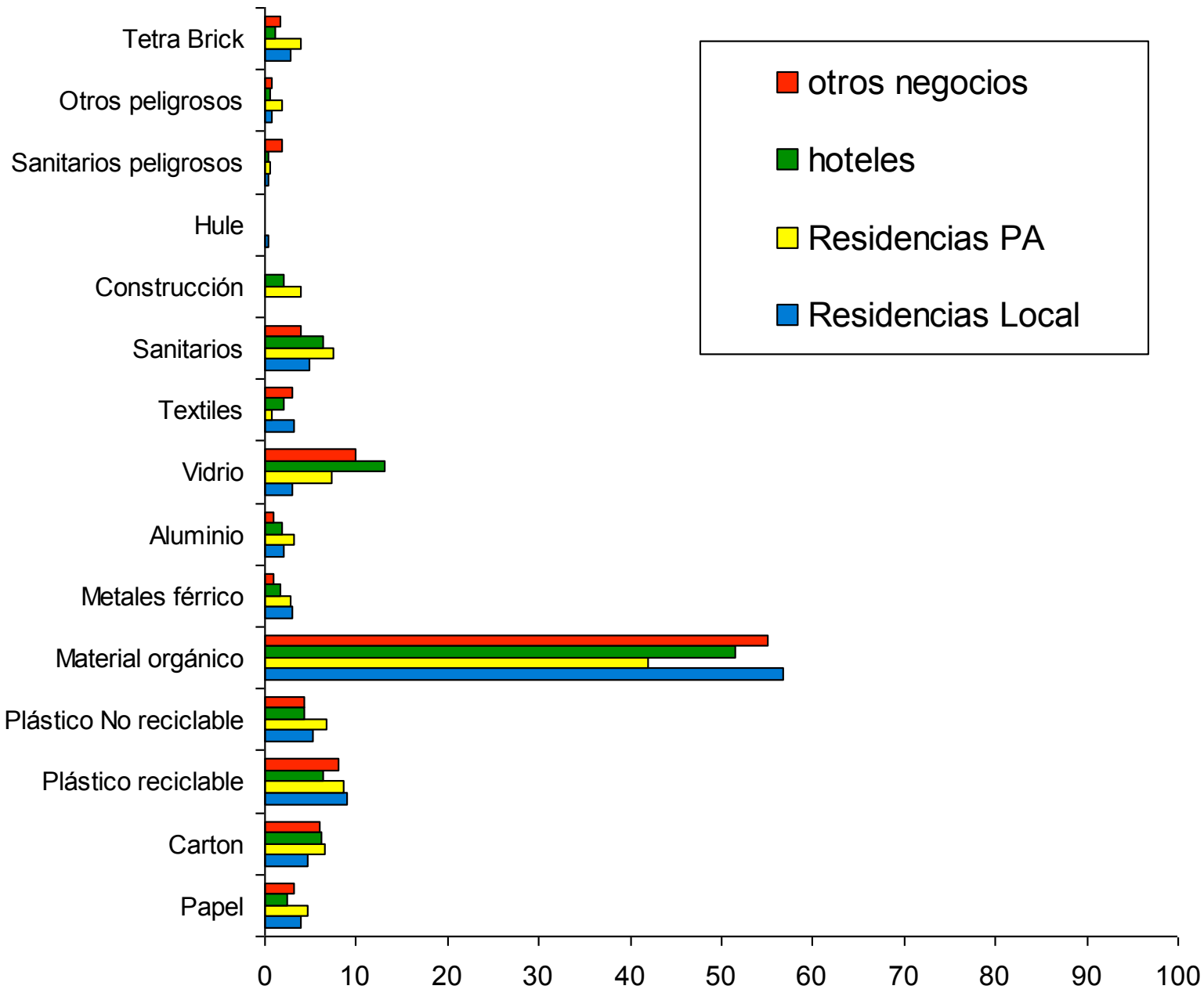
**Probably during high season distribution is different**

## Composición de los desechos sólidos domésticos en Nosara, CR

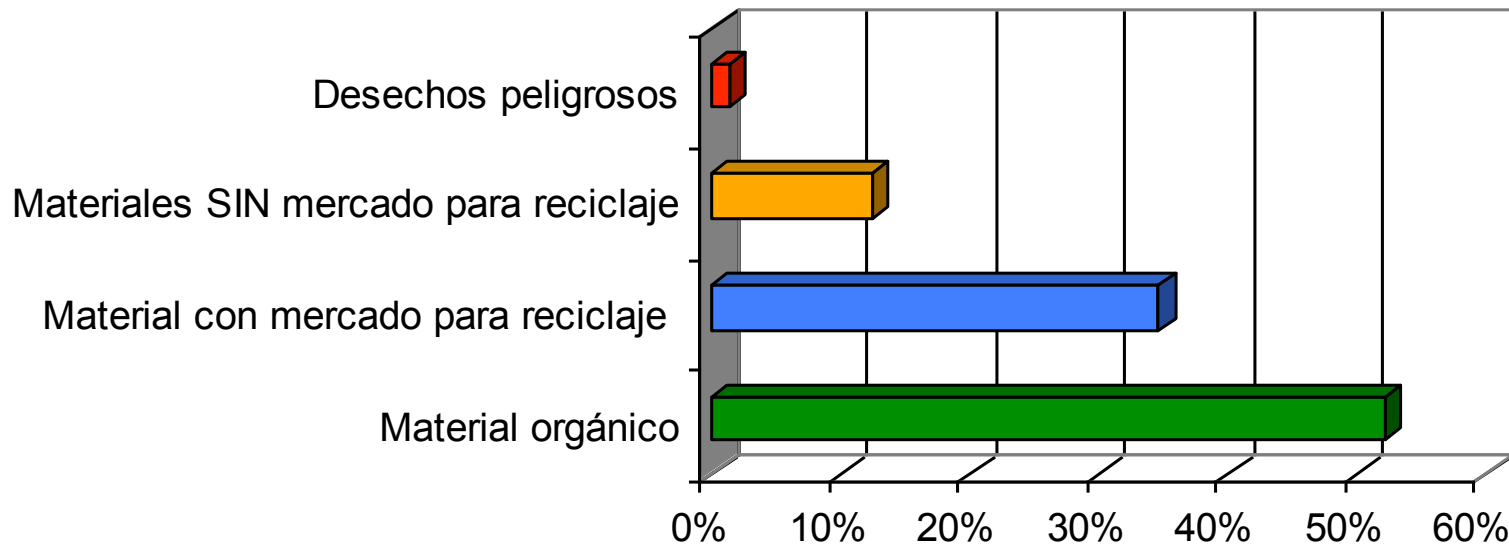




# Garbage composition per sector



# Recycling potential of Nosara´s waste



	Description of the material
Material without market	Non recyclable plastics, sanitary waste, some metals, construction rubble.
Dangerous material	Batteries, medicines, paint and other construction materials, needles,
Organic material	Food and garden scraps, textiles.
Material with MARKET (Recyclable)	Paper, cardboard, glass, cans, plastics, tetrabrick and some ferrous materials.



In Nosara there is NO space for  
GARBAGE, so please:

1. DON'T bring it, DON'T buy it
2. Never throw it
3. Reuse whatever you can
4. Separate recyclable items
5. Return the nutrients of the organic waste back to the soil

*Thanks!*



It is not about appropriate  
garbage handling, it's about NOT  
PRODUCING IT. Use your consumer  
power and demand products and  
packages that don't pollute.

# Voluntary plan for integrated waste management - Nosara

# Strengths-weakness of Nosara

<p><b>Strengths</b></p> <ul style="list-style-type: none"> <li>There is environmental consciousness</li> <li>Recognized tourist destiny because of its Natural Resources</li> <li>Very manageable population size</li> <li>Solid Waste Analysis Done</li> <li>Education centers aware</li> <li>Existing recycling initiatives</li> </ul>	<p><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>Associations/business and people care about the situation</li> <li>Willingness to pay more for the service</li> <li>Market for recyclable goods.</li> <li>Investment capacity</li> <li>Dump land available for sanitary manual landfill</li> <li>Garbage composition has great recyclable potential.</li> </ul>
<p><b>Weakness</b></p> <ul style="list-style-type: none"> <li>Administrative disorganization of Microsan company</li> <li>Microsan Lack of resources</li> <li>Lack of municipal authority/permits</li> <li>Very geographically disperse community</li> <li>Lack of communication between PA and Local communities</li> <li>Burning garbage Culture</li> </ul>	<p><b>Threats</b></p> <ul style="list-style-type: none"> <li>Legal status of the Dump area.</li> <li>Municipal burocracy.</li> <li>DUMP- Possible pollution of groundwater</li> <li>Bad roads</li> <li>Some areas in danger of Floods</li> <li>Cultura de “choteo”/ very criticizing culture.</li> </ul>



# “Law for Integrated Residues Management” (2007)

- *“ Different sectors of Society can develop Voluntary Plans or Programs for the appropriate management of garbage in a certain area or for an specific waste material of their interest” Art 13.*
- First recommendation: To form a Local Committee for Waste Management, along with company **MICROSAN**. *We have to accept that the Municipality is NOT going to intervene and solve any garbage problem, so Nosara Residents must take the responsibility to handle the garbage that THEY are producing. We must abandon the “condescending” culture and stop relying on the government for everything.*



# Waste Management Principles

Art-4 LAW

I. AVOID

I. REDUCE

III. RECYCLE

IV. PROCESS / ADD VALUE

V. TREAT

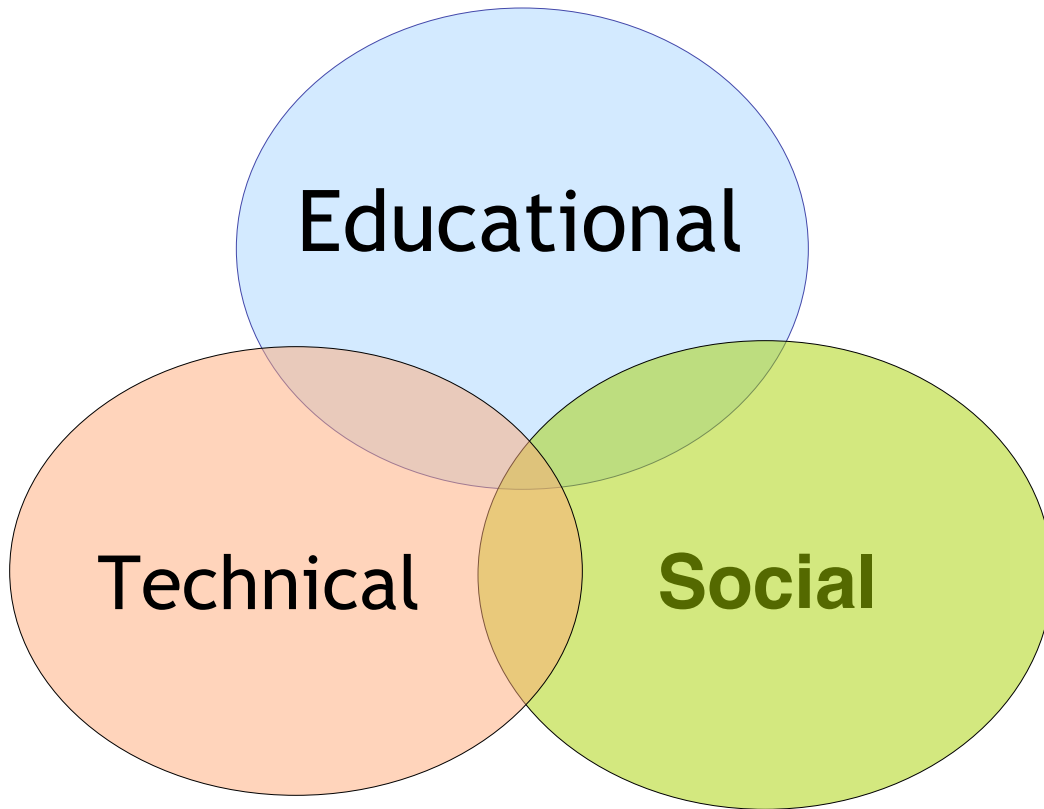
VI. DISPOSE

# Objectives of the Plan

- Define a Holistic strategy for the waste management that comply with Costa Rican laws.
- Promote the community organization.
- Facilitate information to interested parties about appropriate waste management, recyclables markets, laws and resources available in Costa Rica.
- Reduce the production of garbage by environmental education and by extending the responsibility to the garbage producer/designer.
- Promote separation and recycling of waste.
- Define the specific education needs for the areas that produce specific waste.



# Holistic Strategy for garbage management- Nosara



Simultaneous action in these three areas is needed, it is not recommended to educate without having the infrastructure to be consequent .

Area	Accions
<b>Social</b>	<ul style="list-style-type: none"> <li>- To form a Local Committee for Waste Management.</li> <li>- Business must organize to reduce the incoming garbage (pressure to the garbage producer/designer).</li> <li>- Constructors must organize to give better management to their waste.</li> <li>- Legal and Administrative Help for MICROSAN.</li> <li>- Organization of Communities with NO garbage collection service</li> </ul>

- Local Waste Management Committee

- Commercial union

- Construction union

- Dangerous garbage producers

EBAIS y Cruz Roja (Comité de Emergencias)

Asociación de Desarrollo de Nosara

Nosara Civic Association NCA

Empresa MICROSAN

Asociaciones de Desarrollo (Garza, Esperanza)

Juntas de vecinos

Colegios y Escuelas del distrito de Nosara

Asociación ALDETUS

Amigos de Nosara

Consejo de Distrito Municipal

Cámara de Comercio

Gerentes de Hoteles

Gerentes de Restaurantes

Doctores y Veterinarios

ASADAS

House rentals

Representantes del sector Construcción



# Support to MICROSAN

- For the sake of all service users and Nosara in General, the company Microsan must receive support in the following areas:
  - Legal: Municipality permits for charging.
  - Administrative: Accountability, Charging System, Image improvement, better communication with service users.
  - Social: better working conditions in overall.
  - Technical: dump into landfill, better equipment, increase coverage, more personnel (security, collection, recycling).

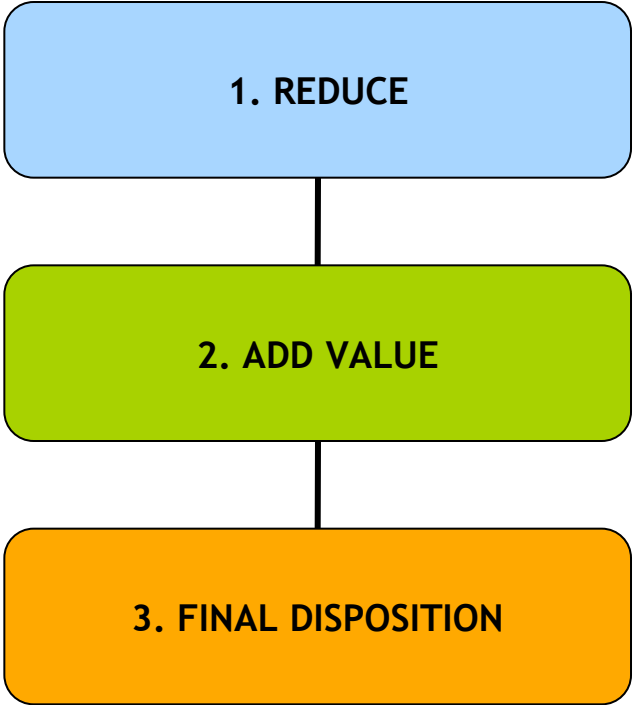
# Organization of Communities with NO access to garbage collection service

- Los Ángeles: 15 houses
- Delicias: 42 houses
- San Ramón, part of Sta. Teresa y Barrio Los Ángeles: 70 houses (approx).

Form micro-committees in each of these neighborhoods that coordinate the to storage and how to transport recyclable materials, and that do a house to house campaign.

Content of the campaign:

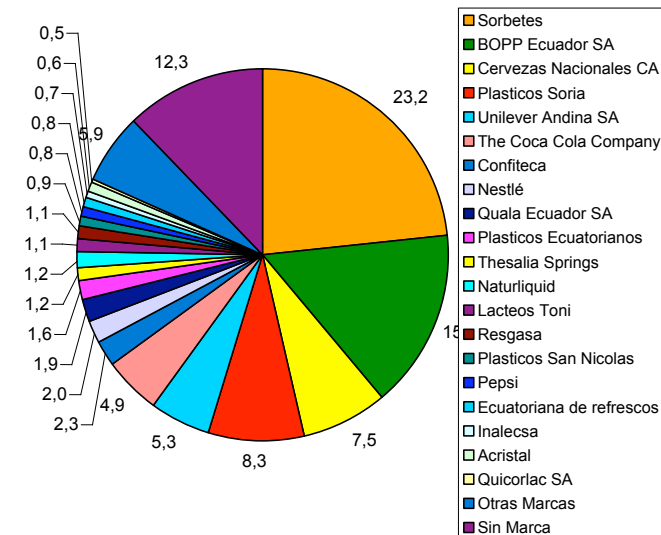
- **Recycling**
- **Organic waste**
- **DON'T burn plastics**
- **Clean Rivers**
- **Garbage burry**

Area	Accions
Technical	 <pre>graph TD; A[1. REDUCE] --&gt; B[2. ADD VALUE]; B --&gt; C[3. FINAL DISPOSITION];</pre>



# Reduce

- More than HALF of our garbage is ORGANIC and can be return to the soil.
  - Hotels and restaurants must organize to have an organic fertilizer plant.
  - Houses produce between 2 to 8 kg and can treat that on place (all houses have garden area)
- Pressure to Garbage deliverers:
  - Organized Business Union
  - Garbage brand Inventory
    - Beach Garbage
    - Collected Garbage



# Adding value to waste

“Ordinary Residues Producers are legally bound to separate, classify and give their Residues to the municipalities or organization in charge for its recycling and final disposition, in the conditions that are set by them”. Art 41

# Adding value to the waste

- Do solid waste analysis frequently (once a month)

	%	ton/year	Price (\$ / ton)	\$ per year
Aluminium	1,70%	23,5	1370	32.182
Paper	3,10%	42,8	200	8.567
Carboard	6,00%	82,9	44	3.648
Plastic	7,30%	100,9	160	16.140
Glass	11,00%	152,0	40	6.080
Organic Material	52,30%	722,7	52	37.580
<b>Total recyclables:</b>	<b>81,4%</b>	<b>1125</b>		<b>104.197</b>
<b>Non recyclable material</b>	<b>18,60%</b>	<b>257,0</b>		
<b>Without Organic waste</b>				<b>\$ 66.617</b>



# Information resources about Recycling

- Principales compradores de desechos de Costa Rica Camacho (2007). Documento: Plan de Negocios para la Implementación de un Centro de Recuperación de Materiales en Guácimo, CR.
- En la versión digital se adjunta un documento de Excel llamado “Centro de Acopio” donde están los formatos para calcular la viabilidad de un centro de acopio en Costa Rica.
- “El Reciclaje Oportunidades Para Reducir la Generación de los Desechos Sólidos y Reintegrar Materiales Recuperables en el Círculo Económico”
- Reporte Nacional del Manejo de Materiales 2006 elaborado por Programa CYMA, donde se indican las características y posibilidades de reciclaje de todos los materiales de desechos.
- Lista de todos los centros de acopio y reciclaje de CR,

# Re - USE waste materials in a creative way

*There are many  
potential business to  
develop in this area*



Juegos elaborados a base de  
botellas plásticas



Bolsos tejidos con hilos de bolsas  
plásticas



Carteras he-  
chas con cajas  
tetrabrick



Paredes hechas con  
botellas de vidrio



Pupitre hecho con cajas  
tetrabrick procesadas >



Carteras hechas con  
neumáticos



Papel hecho a base  
de papel usado



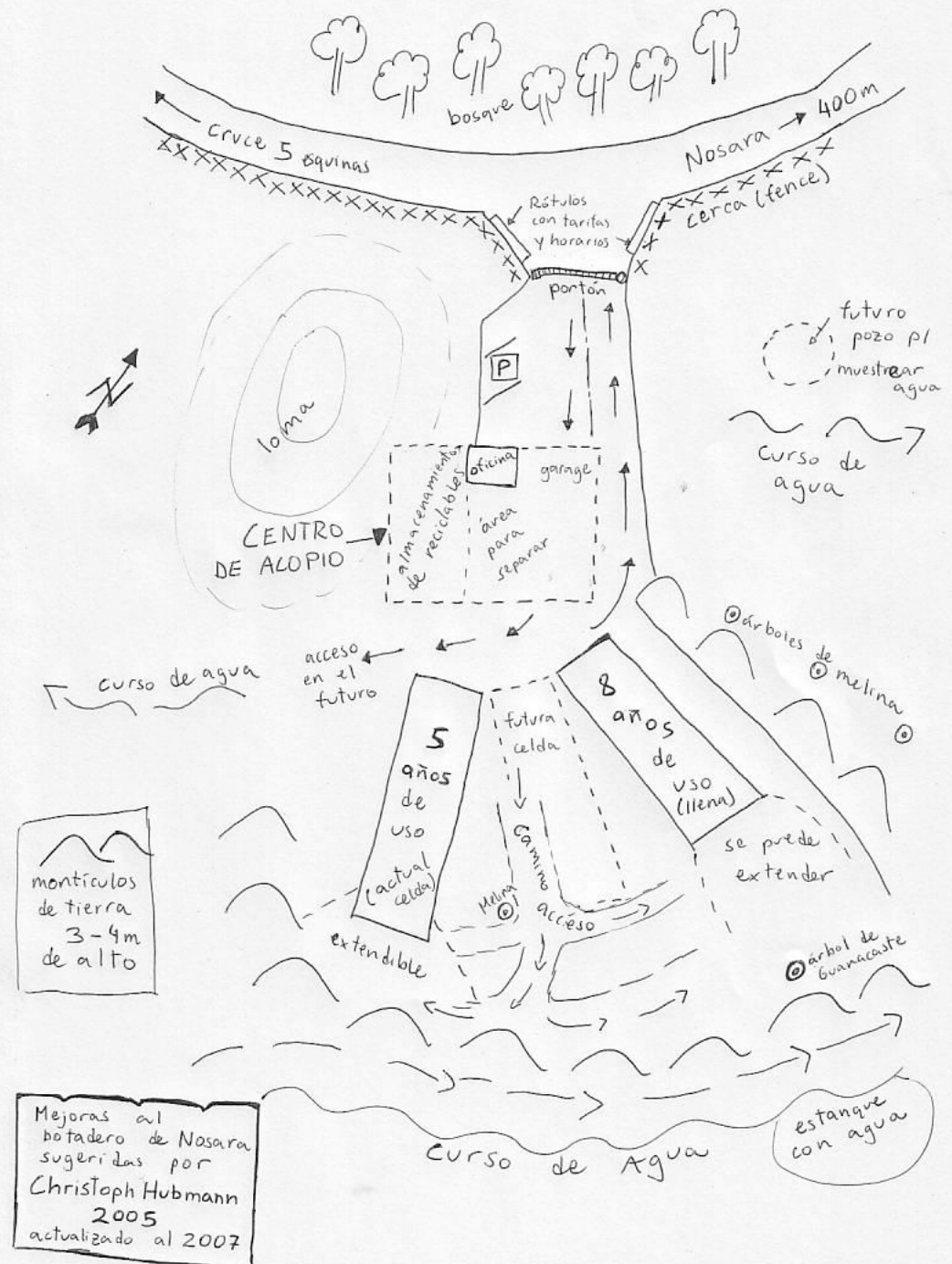
Bolso hecho  
con periódicos



Pizarra hecha con  
corchos de vino

# FINAL Garbage disposition

- Transformation of the DUMP into a Manual Sanitary Landfill
- Recycling center
- New trench
- Garbage cover
- Security
- Water testing
- And more...
- Extraordinary bills
- Information resources





# Education Strategy

Sector	Subjects	Methodologies.
Commercial	<ul style="list-style-type: none"> <li>-Organic waste processing plant.</li> <li>- Reduction, separation and recycling at Hotels and Restaurants.</li> </ul>	<ul style="list-style-type: none"> <li>- Meetings and workshops directed to owners and managers.</li> <li>- Visit hotels and places that already have integrated waste management.</li> </ul>
Construction	<ul style="list-style-type: none"> <li>- Construction Rubble/waste <u>Reduction and Recycling</u>.</li> <li>- Keeping tidy the construction area without polluting other place.</li> </ul>	<ul style="list-style-type: none"> <li>- Meetings and workshops directed to owners and managers.</li> <li>- Printed and email information about green building.</li> </ul>
Dangerous Waste Producers	<ul style="list-style-type: none"> <li>- Appropriate handling and disposal of dangerous residues.</li> </ul>	<ul style="list-style-type: none"> <li>- Workshops for principal producers.</li> <li>- Send information Via email and printed to main producers.</li> </ul>

Sector	Subject	Methodologies.
<b>Local and Foreign Residents</b>	<ul style="list-style-type: none"> <li>- Problems from Burning Plastic.</li> <li>- Nosara's Waste separation System.</li> <li>- The potential of Organic Matter.</li> <li>- Special Residues (machines)</li> </ul>	<ul style="list-style-type: none"> <li>- House by house campaigns.</li> <li>- Voice of Nosara</li> <li>- Via email</li> <li>- Signs in Public Places</li> <li>- Give related messages through different churches</li> </ul>
<b>Education Centers (students) *</b>	<ul style="list-style-type: none"> <li>- Establishment of separation and recycling systems*.</li> </ul>	<ul style="list-style-type: none"> <li>- Workshops to the High School and that they disseminate the information to the schools.</li> </ul>
<b>Tourists</b>	<ul style="list-style-type: none"> <li>- Nosara's Waste separation System.</li> <li>- Organic waste is NOT garbage, must return to the soil.</li> </ul>	<ul style="list-style-type: none"> <li>- Through House rentals.</li> <li>- Signs at the street.</li> <li>- Voice of Nosara</li> <li>- Surf Schools.</li> <li>- Night Life places.</li> </ul>

\* The 19 article of the Law, indicates that “all education centers of the country must have and implement integrated waste management systems to deal with their refuse as a way of teach to the students a practical integrated waste management technique “.

# Thanks for your attention

- And please remember:
  - Organic refuse is NOT garbage, return it to the soil or animals
  - Separate recyclable materials
  - NEVER burn plastic garbage.
  - Participate in beach and town cleaning campaigns.
  - Dare to form part of the Waste Management Comittee



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GARBAGE, so please:

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