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A photograph of a mangrove restoration site in the Limpopo estuary. The foreground shows several young mangrove saplings planted in rows on a sandy bank. The background shows a dense line of trees under a clear blue sky.

Mangroves Restoration in Limpopo estuary

THECNICAL ACTIVITIES PRESENTATION



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Background and Key Components of the Grants

- ❑ A “mangrove” has been defined as a “tree, shrub, palm or ground fern that have specific adaptations to survive in conditions of submersion in brackish waters in in the intertidal zones of marine coastal environments, or estuarine margins”.
- ❑ The mangrove ecosystem has a high economic value and benefit, especially to coastal people.
- ❑ the World Atlas of Mangrove (2010) estimated the value of USD 2,000.00 – 9,000.00/ha/year where mangrove are extensive, the forest products (timber, charcoal, firewood and others) and non-timber products are also unique, sustaining fishery resource, as coastal protection, provide recreation and environmental education sites, reducing carbon emission to avoid global warm.



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Background and Key Components of the Grants

- ❑ According to World Atlas of Mangroves (2010) , this ecosystem is growing in 123 tropical and sub-tropical countries, including Mozambique.
- ❑ The total world area covered by mangrove is around 150,000Km², around 5.2% (7,917Km²) is in East and Southern Africa region
- ❑ In Mozambique, the mangrove covered area is about 396,080ha and 50% of mangroves is focuses on the Zambezi delta and Quelimane.
- ❑ Most big coverage in terms of size (33.5%) and species diversity (36-47 species) is the South East Asia region. There are around 73 species recognizes as “true” mangrove and 20% of it is declining in the last 25 years due mainly to conversion (land use change) and coastal regions development.
- ❑ The mangrove degradation is 3-4 times faster than terrestrial forest types and the recovery is slow.



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Background and Key Components of the Grants

- ❑ The total area of mangrove in the Limpopo river estuary is about 928ha. Around 546ha are degraded and only 382ha are considered in good conditions.
- ❑ In the Gaza province and Limpopo river basin the mangrove only occur in this area and the dominant specie is *Avicennia marina* (99.5%) among other: *Rhizophora mucronata*, *Brugiera gymnorrhiza*, *Ceriops tagal* and *Heritiera littoralis* (Gove & Boane, 2001; Balidy *et al.*, 2005).
- ❑ The CDS-ZC replantation effort started in 2009 is only covered 30ha, under 10% of degraded area.
- ❑ There is a need to bring more stakeholders and strengthen the local community to continue with the work.



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Background and Key Components of the Grants

- ❑ In the Limpopo River estuary the pressure on natural resources use is increasingly growing and given the fragility of its ecosystems, the effects are visible, mainly because the mangrove is used as firewood and construction material.
- ❑ **The height and diameter of mangrove trees show that they form an old ecosystem in the region, but it has a weak regeneration capacity.**
- ❑ There are many hypotheses for this situation, namely: 1) decreasing of water and solid (mud/clay) flows; and 2) during the 2000 floods the mangrove and the estuary area was overwhelmed by a large volume of sediment that altered soil conditions for the mangrove development.



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Background and Key Components of the Grants

- ❑ The Limpopo estuarine system is an important site for breeding of various marine species (fish, shrimp, crab, squid and others), whose larvae possibly migrate swept away by sea currents, which can feed south region of Mozambique namely Bilene, Macaneta and Maputo Bay systems. These ecological capabilities and economic characteristics are unique in the Gaza province, one of the main centers of Artisanal Fisheries (Barra do Limpopo) lies in this estuary.
- ❑ The local community, Zongoene Administrative Post with around 27,000 people, has been used this natural resources for their livelihood, where the main activities are: agriculture, fishing and tourism.
- ❑ This ecosystem is likely to be affected by climate change that will probable increase the extreme events in frequency and severity.



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Background and Key Components of the Grants

- ❑ This will limit the coping options of the local community and affect their resilience, considering that their main activities are depending on the natural resources.
- ❑ To date, relative sea-level rise has likely been a smaller threat to mangroves than anthropogenic stressors, which have likely accounted for most of the global average annual rate of mangrove loss, estimated to be 1–2%, with losses
- ❑ CDS-ZC in collaboration with RESILIM will implement capacity building activities aim to produce communication and awareness material to enhance the local people knowledge about mangrove conservation.



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Background and Key Components of the Grants

- ❑ Based on this limited information, relative sea-level rise could be a substantial cause of future reductions in regional mangrove area, contributing about 10–20% of total estimated losses (Gilmen, Eric., *at al.*, 2007).
- ❑ RESILIM will contribute with the climate change adaptation strategy that will including scenarios of climate change impact on ecosystems and people.
- ❑ It is important to improve the knowledge about the potential and value of this mangrove ecosystem for appropriate conservation measures, considering the human and climate change threats.



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Background and Key Components of the Grants

- ❑ The CDS-ZC is implementing a mangrove re-plantation project considering the ecological and economic values for the communities.
- ❑ RESILIM can contribute to this effort by provide science based information about the potential area of estuary mangrove, environmental and economic value of the ecosystem as well as produce the awareness and communication materials.



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The main problems identified in the mangrove conservation initiative are:

1. Lack of detailed maps on mangrove potential area that include the historical and current mangrove presence. This will help the coastal planning for mangrove replantation and adapt to facilitate mangrove migration with anticipated relative sea level rise due to climate change.
2. There was no study conducted about the economic value of mangrove that can be used to support the importance of conserve and the local community benefit from it;
3. Studies demonstrated that the mangrove lost is mostly due to human factor, there for there was needed to build stakeholders and community awareness to enable educated adaptation though workshops and action research.



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Purpose and specific objectives

- The purpose of CDS-ZC and RESILIM partnership is to improve the implementation of this initiative through ecosystem potential evaluation (environmental and economic value) and raise awareness about the biodiversity conservation, while building the ecosystem and people resilience to deal with climate change.



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Purpose and specific objectives

- The partnership had three main objectives:
 1. To improve mangrove mapping to have a better understanding of the potential area of mangrove ecosystem;
 2. To conduct the mangrove ecosystem environmental and economic evaluation to support the communication to justify the sustainability and replicability of the mangrove re-plantation project;
 3. Capacity building in awareness materials to improve communication about the importance and how to conserve biodiversity and other key ecosystems.



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Methodology/Approach

Proposed approach

- ❑ The Center for Sustainable Development of Coastal Zones (CDS-ZC) was a technical branch of Ministry for the Coordination of Environmental Affairs.
- ❑ Their mandate is research, awareness and the implementation of demonstration activities in coastal zones about natural resources management and ecosystem use.
- ❑ This entity is also responsible for field data collection of coastal ecosystems management and use.
- ❑ The geographical coverage of this entity is the entire Mozambique coastal zones including the inland lakes, like Niassa, and all the artificial lakes (dams) like Cahora Bassa and Massingir dam within the Limpopo basin (Oliphant river).



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Methodology/Approach

- ❑ CDS-ZC was already implementing mangrove replantation project with community based natural resources management approach and can be a source for learn about how to engage the local community in biodiversity conservation activities.
- ❑ RESILIM had improved the implementation of CDS-ZC mangrove replantation project through a partnership where they CDS-ZC continued to provide technical assistance to local community for mangrove replantation activities while RESILIM supporting in mangrove ecosystem potential evaluation and capacity building to CDS-ZC and local community.



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Methodology/Approach

- The community was engaged in the mangrove replantation project that CDS-ZC implemented through government funded program called “*Programa de Apoio ao Sector do Ambiente*” – (Environment Sector Support Program).
- The community was been paid to do the related works as an incentive but this monetary compensation was limited the project sustainability and RESILIM in collaboration with CDS-ZC will find a way to improve this approach to ensure the sustainability.



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Phases of the partnership

- The partnership considered the following phases:
 1. Joint (CDS-ZC and RESILIM) project design and planning;
 2. **MoU between CDS-ZC and RESILIM for project implementation with a duration of year renewable;**
 3. Project implementation. Anticipated components based on consultation done by RESILIM:
 - Improving mangrove mapping;
 - Environmental and economic evaluation of the mangrove ecosystem;
 - Capacity building and awareness material.
 - Piloting the mangrove replantation



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Phases of the partnership

- ❑ The aim of this partnership is was build capacity at the institutional level (CDS-ZC and LIMCOM biodiversity task team) and community considering that RESILIM is a project with limited lifespan and it is important to create capacity for implementing biodiversity conservation and climate change adaptation activities and fund raising.



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RESILIM : Resilience in the Limpopo River Basin Program



**MAPPING OF MANGROVE VEGETATION
COMMUNITIES AND DEGRADED AREAS IN
THE LIMPOPO BASIN ESTUARY**

Maputo, September 2014



República de Moçambique
Ministério de Terra, Ambiente e Desenvolvimento Rural
Centro de Desenvolvimento Sustentável para Zonas Costeiras



**Avaliação Económica do Ecossistema dos Mangais no
Estuário do Limpopo**

2014



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RESILIM : Resilience in the Limpopo River Basin Program



Main Achieved Results



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Main Achieved Results

Plano de Aula 1: Mangais – uma introdução



2015
Florestas de
Mangal no
Estuário do Rio
Limpopo

Resumo

A primeira lição utiliza vídeo(s) para fornecer aos alunos uma introdução aos mangais (o que são, que benefícios é que os humanos e os animais recebem dos mangais, porque é importante protegê-los, etc. Os alunos irão também familiarizar-se com os animais aquáticos que fazem parte do ecossistema do mangal.

Objectivos

Um conhecimento mais aprofundado dos alunos referentes aos conteúdos:

- O que é são os mangais
- O que é um ecossistema
- Que animais vivem no ecossistema do mangal
- Que papel estes animais desempenham para manter o ecossistema saudável

Actividades

Os alunos irão:

- Ver um vídeo(s) sobre os mangais
- Ver as fotografias dos vários animais aquáticos que fazem parte do ecossistema do mangal
- Aprender novas palavras utilizando puzzles e através de discussões em grupo

Notas Didácticas

Os mangais são florestas constituídas de árvores e arbustos tolerantes à salinidade. Crescem em locais com águas salobras pouco profundas podendo ser estuários, baías, ilhas e locais protegidos de impacto directo das ondas, correntes e ventos. Os estuários de água salgada são áreas aonde os rios de água doce se encontram e misturam com as águas oceânicas. A mistura da água salgada com a água doce cria um habitat intensamente vivo, em constante mudança e por vezes stressante para as plantas e os animais.

As raízes dos mangais é o habitat de muitas espécies de animais tais como os caranguejos, caracóis, gambas, peixes, enquanto os pássaros fazem os seus

Preparação do Professor

Leia as Notas Didácticas aos alunos.
Familiarize-se com a terminologia

Materials

- Papel e Caneta

Palavras-chave para aprender

Mangais Biodiversidade
Ecossistema Espécies
Estuário

Procedimento

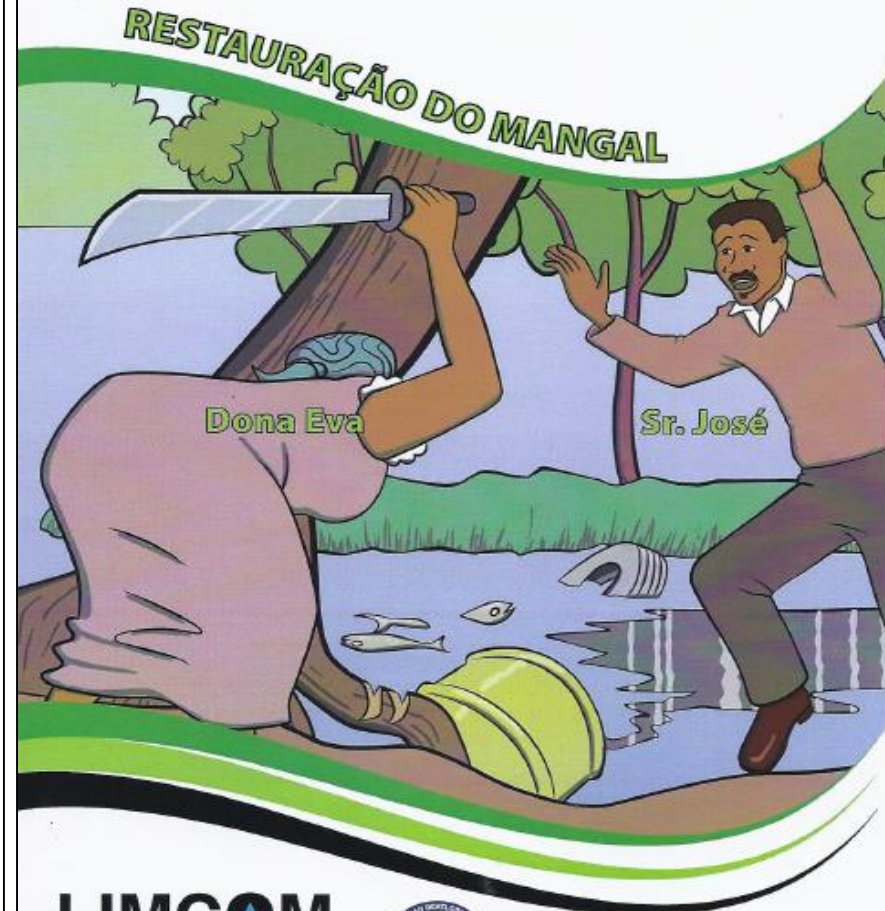
- Ler as Notas Didácticas aos alunos, seguido de uma discussão em grupo.
- Os alunos vêm os vídeos do "Mangrove Mystery" e/ou o "Tropical Mangrove Forest" através do YouTube
- Em pequenos grupos, os alunos definem o vocabulário-chave e criam uma lista de 10 animais que vivem nos mangais.
- Os alunos trabalham em pares para completar as palavras cruzadas.



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RESILIM : Resilience in the Limpopo River Basin Program

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LIMCOM
LIMPOPO WATERCOURSE COMMISSION





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Main Achieved Results





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Main Achieved Results





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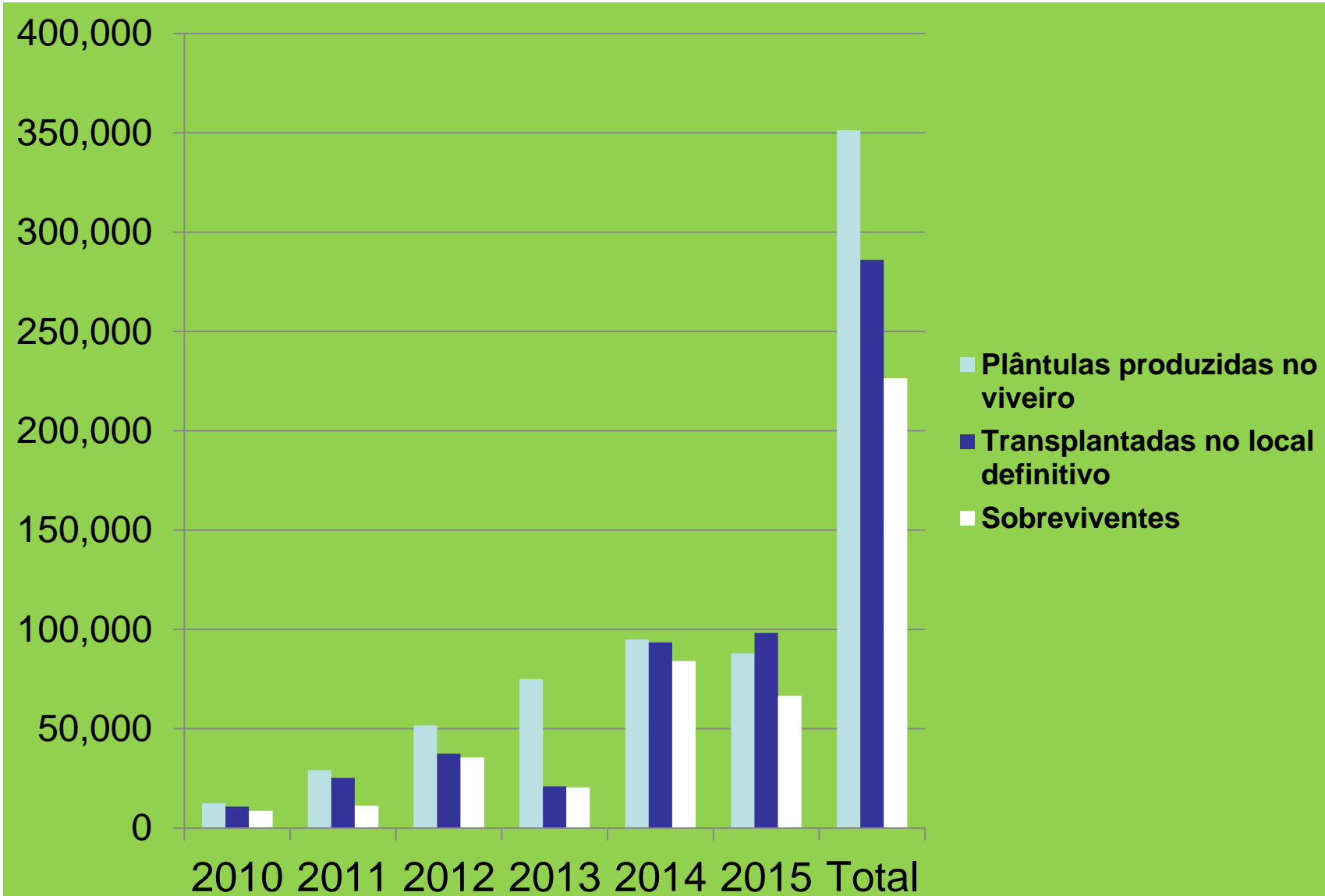


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Main Achieved Results

Seedlings





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Main Achieved Results





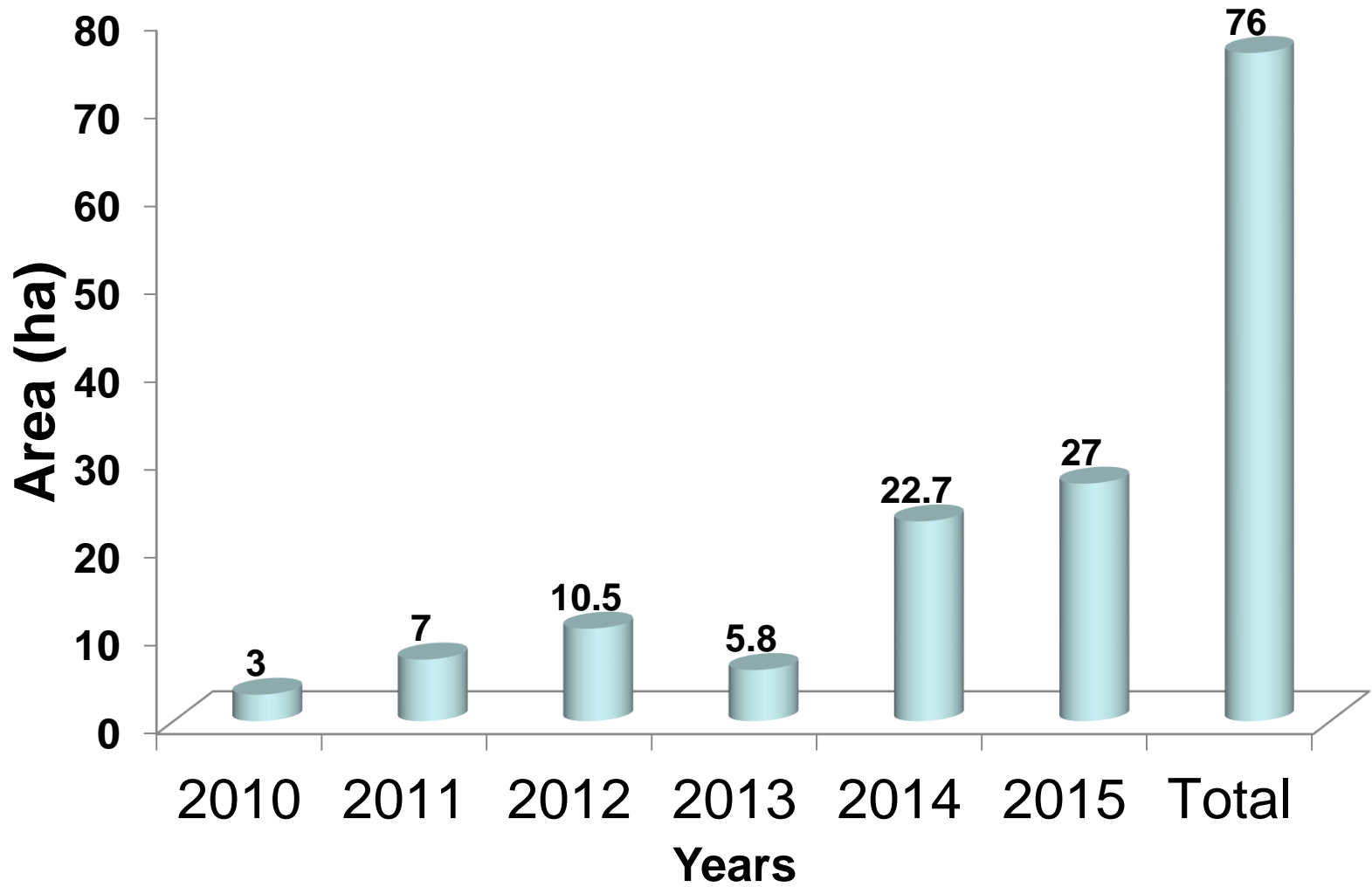
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Main Achieved Results





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Before



Now





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Thank You!

