

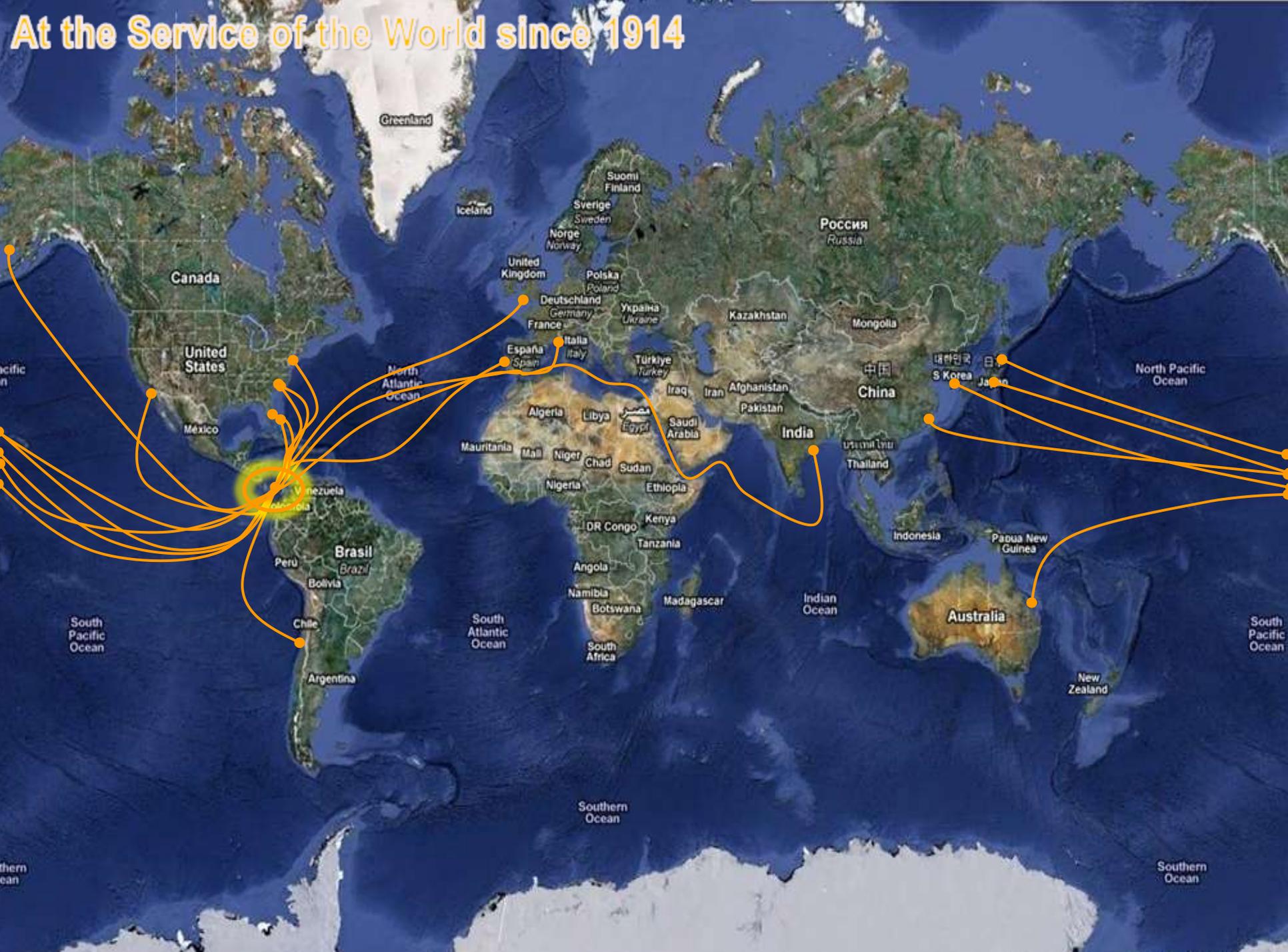
Sustainability and Greenport Practices at The Panama Canal



Esteban G. Sáenz
Executive Vice-president
Environment, Water, and Energy
Panama Canal

AAPA Facilities Engineering Seminar,
November 8-10, 2011

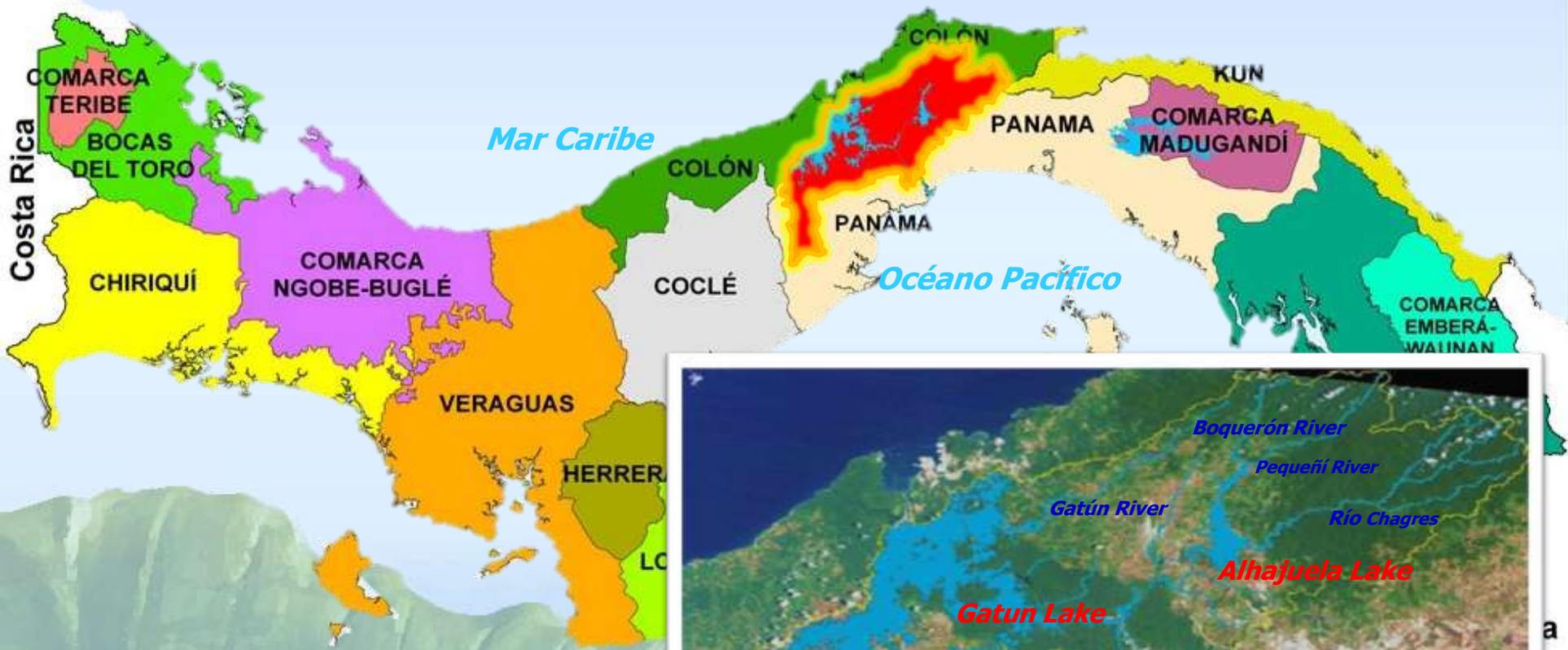
At the Service of the World since 1914



How Does it Work?

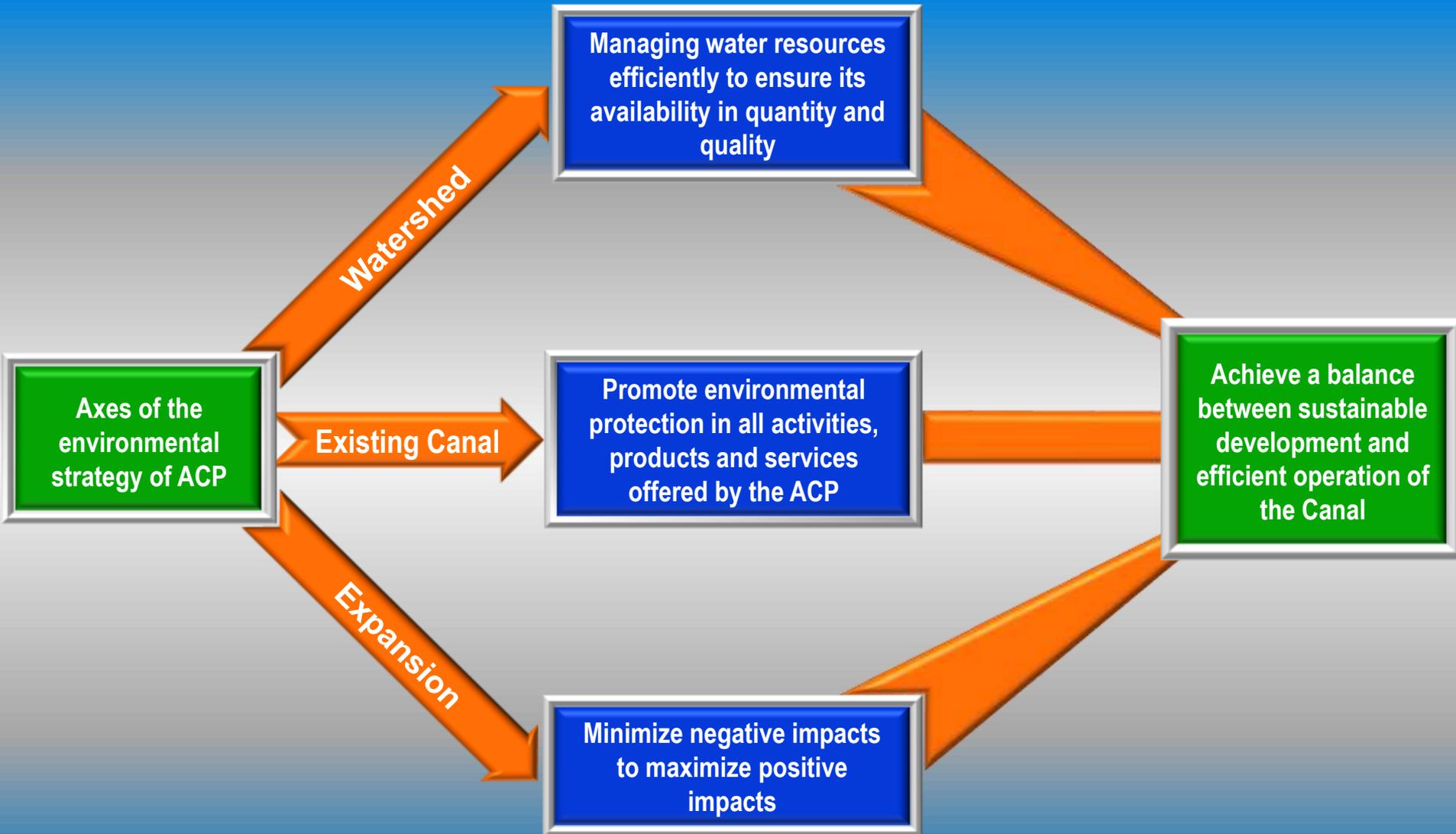


Panama Canal Watershed



345,319 hectares (853,301 Acres)
<5% of the Country's Territory
>70% GDP is generated in its surrounding areas

Environmental Strategy of ACP



Environmental Management System



On June 2003 ACP, received and maintained ISO 14001 Environmental Management System Certification.



Panama Canal Duties

 Establishes actions to conserve the environment in operational and compatibility areas of the Panama Canal

 Conducts inspections and environmental follow-up to identify and analyze pollution activities

 Develops and communicates legislation and environmental regulations to avoid contamination in areas under ACP responsibility

 Establishes pollution control, prevention and reduction measurements and identifies environmental aspects and impacts in the operations of the Panama Canal



Control and Environmental Management Programs



Environmental Inspection



Energy Savings



Materials and Residues Management



Emissions Control (air quality)



Corporate Environmental Performance Index



Hydrocarbons Pollution Control and Management of oily water and used oil

Environmental Inspection Program



 Operational Areas: verify the fulfillment of the environmental measures established through the Environmental Adequacy Programs, Environmental Impact Studies and environmental legislation



 Compatibility areas and watershed : verify the fulfillment of the Environmental Management Plan and Environmental Management and Adequacy Plans

Energy Savings Program



 Accomplishment of energy savings measures in administrative and operational areas

 Implementation of an awareness campaign and strategy



Materials and Residues Management Program

-  Promote the efficient use of materials
-  Reduce waste generation
-  Seek alternatives of resources recuperation through processes like reutilization , recycling, residues commercialization and adequate final disposition



Emissions Control (Air Quality)



 Fixed source measuring: Miraflores
Thermoelectric Plant

 Mobile source measuring: vehicles of ACP
fleet



Hydrocarbons Pollution Control, Management of oily water and used oil



Investigation, response and mitigation of hydrocarbons spills



Proactive prevention through labor training (annual exercises of hydrocarbons spills)



Collection of used oil in floating equipment and ACP shops



Oily water treatment



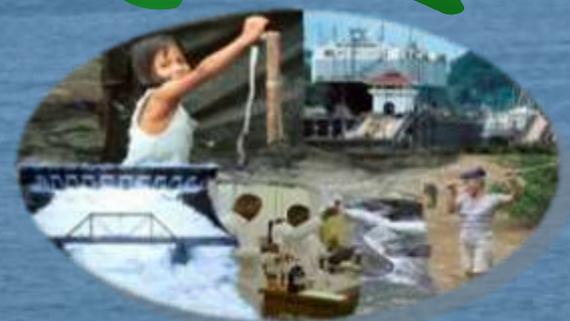
Sustainable Development and Watershed Management



Economic



Environmental



Social and cultural

Equilibrium



Socio-environmental Management in the Panama Canal Watershed

Water

- Quantity
- Quality
- Forest coverage
- Land uses



Axis water-people

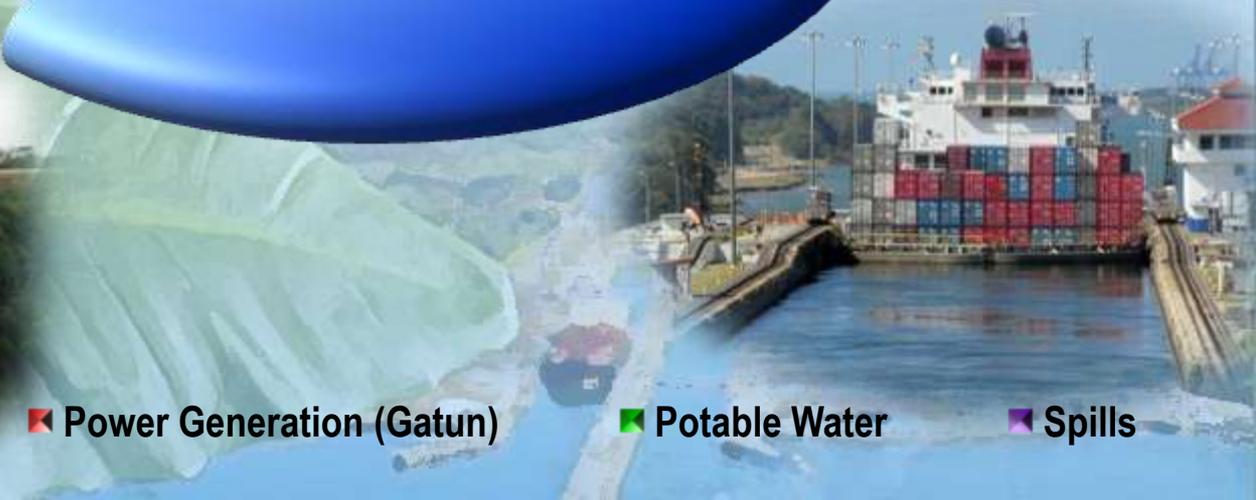
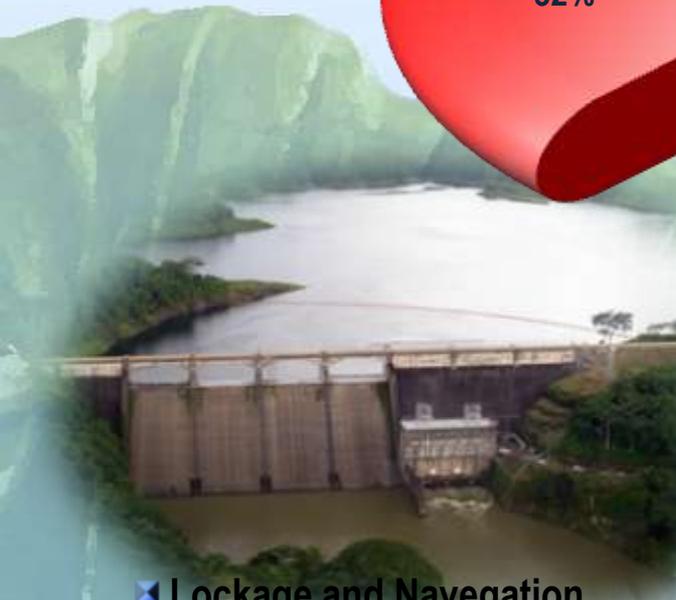
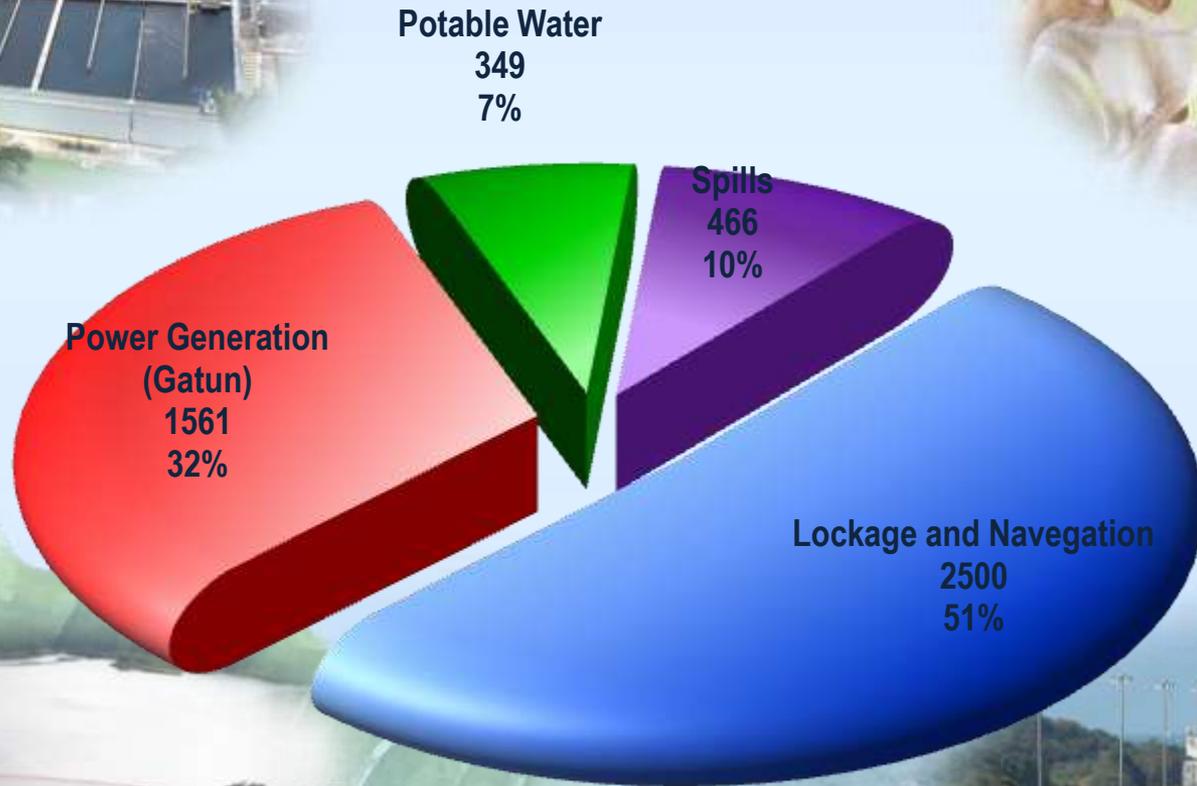
People

- Uses:
 - Consumption
 - Recreation
 - Economic activities
- Pressure:
 - Discharges
 - Solid waste
 - Deforestation
 - Inappropriate land use
- Effects on population:
 - Resources shortages
 - Diseases
 - Soil loss
 - Competition for use



Water Use in the Panama Canal

10 year average (2000 -2009) Millions of cubic meters



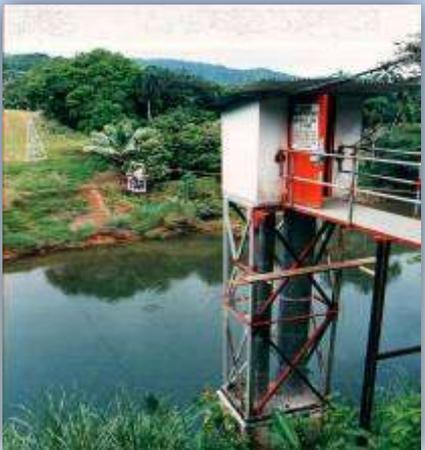
Lockage and Navigation

Power Generation (Gatun)

Potable Water

Spills

Monitoring Water Quality and Quantity



 Collect data on water quality on the watershed

 Ensuring the highest quality water supply for the population, human activities and operations of the Canal



62 sampling points for water quality



Analysis performed:
Conductivity, BOD, Temperature, Nitrates, Dissolved oxygen, Nitrites, Total and fecal coliforms, pH, Turbidity, Alkalinity, Chlorides, Sulfates, Total dissolved solids, Calcium, Magnesium, total suspended solids, Potassium, Sediments, Sodium Phosphates

Environmental Education

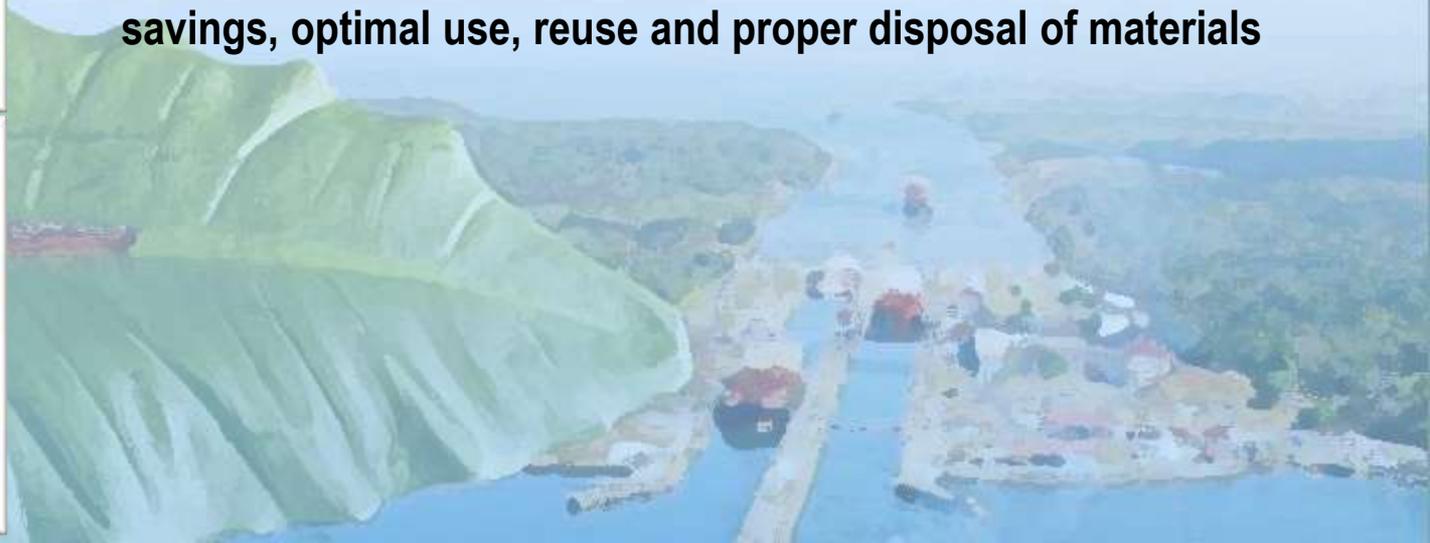


 **Environmental Education Program in Public Schools in the Panama Canal Watershed**

 **Watershed Guardians - to educate teachers and students of the watershed for the conservation of water resources**

 **Our Canal and its watershed - Promotes a culture of entrepreneurship and responsible use of natural resources**

 **The 3R Campaign: Reduce, Reuse and Recycle, to encourage savings, optimal use, reuse and proper disposal of materials**



Panama Canal Expansion Program Components

\$5.25 Billion investment over a 7 year period



Atlantic Ocean

Atlantic Post Panamax Locks



Increase the Maximum Operating Level of Gatun Lake



26.7 m → 27.1 m



Deepening & widening of the Atlantic entrance

Pacific Post Panamax Locks

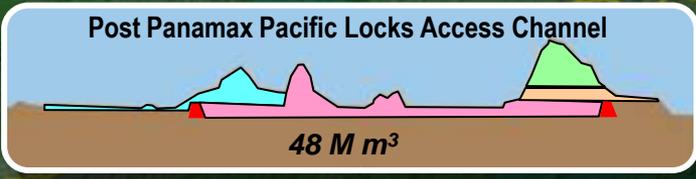


Deepening & widening of the Gatun lake & Culebra Cut navigational channels



Deepening & widening of the Pacific entrance

Post Panamax Pacific Locks Access Channel



48 M m³

Pacific Ocean

Environmental Monitoring

-  Programs
-  Air, Noise and Vibrations Control
-  Soil Protection
-  Water Resources Protection
-  Flora and Fauna Protection
-  Waste Management
-  Materials Management
-  Socioeconomic and Cultural Resources



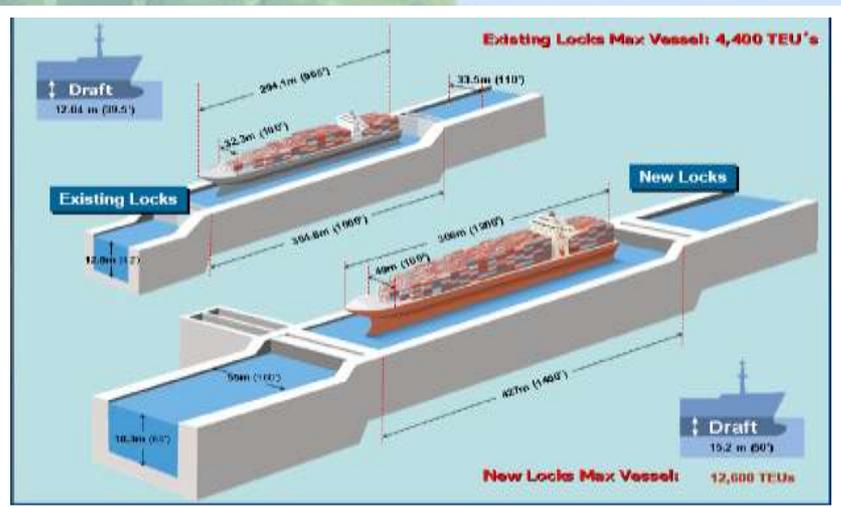
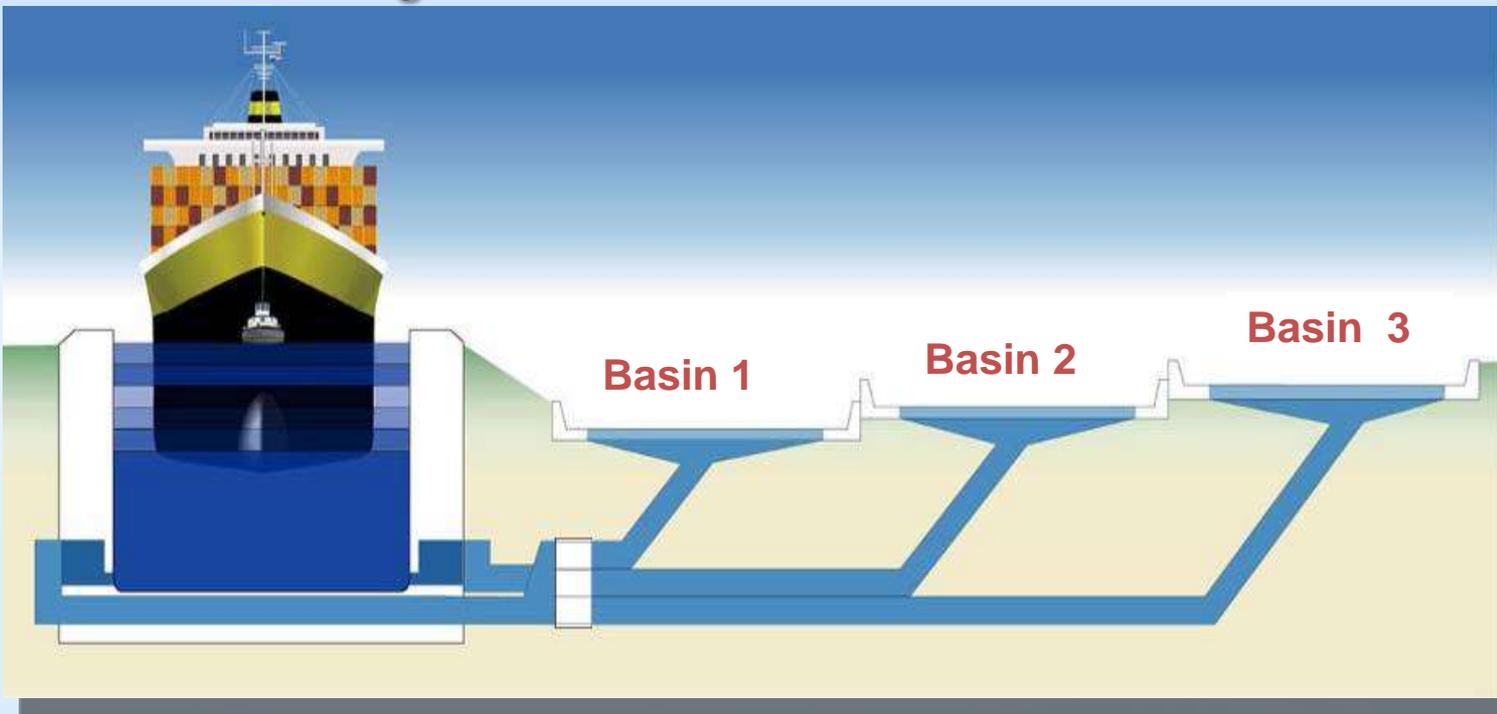
Environmental Management Plan

-  Plans
-  Monitoring and follow-up
-  Citizen Participation and disclosure
-  Risks Prevention
-  Wildlife Rescue and Relocation
-  Environmental Education
-  Contractor Contingencies
-  Environmental Restoration and Closure



Adaptation to the Climate Change

The Panama Canal Expansion project is an adaptation model for the climate change



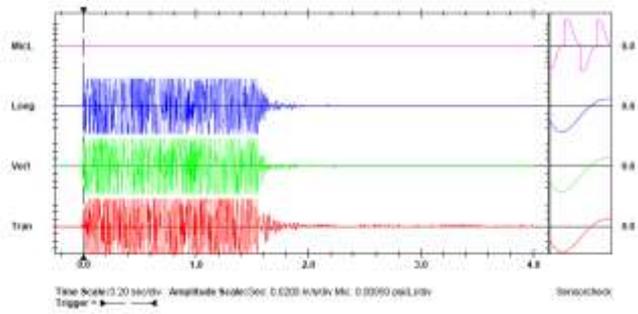
- With the new water saving basin system, the new locks will utilize 7% less water than the existing locks
- 60% of the water is reutilized in each transit
- It will not require new reservoirs for the operation of the new locks

Erosion and Sedimentation Control



Air, Noise and Vibration Control

-  Equipment working conditions
-  Dust control
-  Materials transport, storage, mixing, loading and unloading procedures
-  Blasting controls
-  Noise evaluations



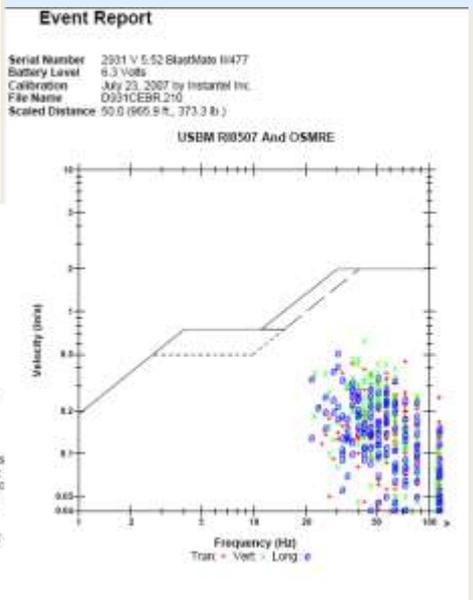
Extended Notes
 Volad. Terrestre #502A01-1 Cartagena CUSA
 Posicion de Voladara: E051415 N0560130
 Posicion Senograf: E051309 N0997419

Post Event Notes

Microphone: Linear Weighting
 PSPL: 0.0005 psf(L) at 0.976 sec
 ZC Freq: 14 Hz
 Channel Text: Passed (Freq = 20.0 Hz Amp = 517 rev)

	Tran	Vert	Long	Units
PPV	0.0458	0.0700	0.0700	in/s
ZC Freq	23	7.0	12	Hz
Time (Rel. to Trip)	0.973	0.964	0.976	sec
Peak Acceleration	0.0398	0.0396	0.0396	g
Peak Displacement	0.00042	0.00105	0.00101	in
Sensorcheck	Passed	Passed	Passed	
Frequency	7.5	8.0	7.7	Hz
Overswing Ratio	3.5	3.2	3.7	

Peak Vector Sum: 0.0769 in/s at 0.978 sec



Wildlife Rescue and Ecological Compensation

Wildlife Rescue



mammals



reptiles



amphibians



Reforestation Program 2008-2010:



665 Hectares

Ecological Compensation:



a total of 2,988,147.00 US \$ has been paid in concept of ecological compensation



Cultural Resources

-  Contract with Smithsonian Tropical Research Institute for:
 -  Paleontological research and rescue
 -  Reconstruction of plant and animal diversity
 -  Oceanic and climatic model addressing variations due to the rise of the Isthmus
 -  Detailed Geological Map
 -  Stratigraphy and structural model of the Canal and tectonic evolution of the Isthmus
 -  Geological dating of units of interest



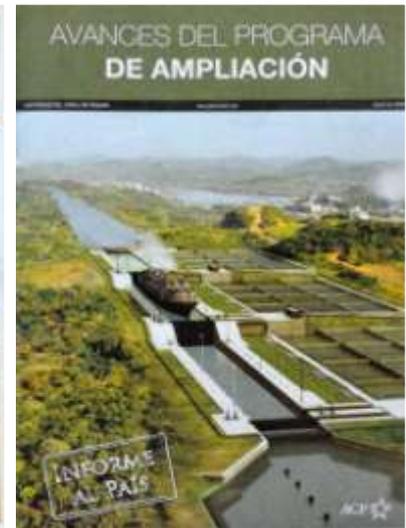
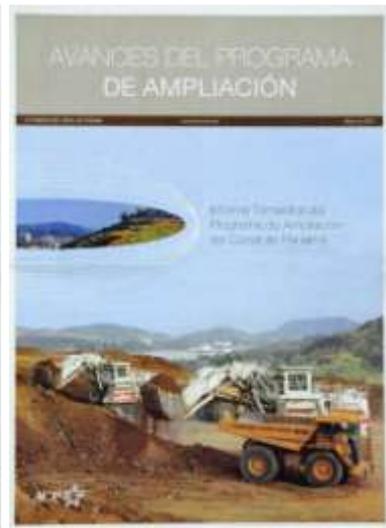
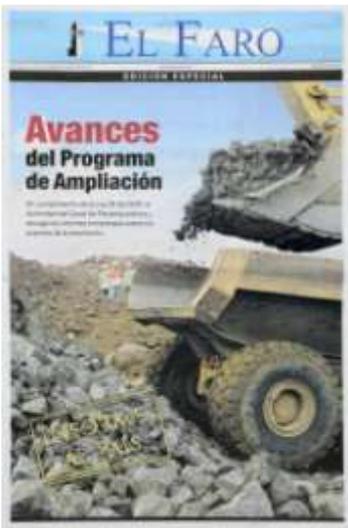
Culebra Cut



Progress Reports on the Expansion Program



**TU CANAL,
AL DÍA**



External Reports

Inspections and Audits:

-  **Compliance verification, review and evaluation of contractor's monthly reports**
-  **Periodic inspections: Contractor, ACP and ANAM**



Work is carefully planned, evaluated and executed to prevent, minimize, and mitigate adverse impacts and improve environmental performance





Components of the Green Route Concept

 The socio environmental commitment of ACP in the Panama Canal watershed



 The reductions of CO2 emissions in the planet, as a result of the Panama Canal route



 Establish ACP as a carbon neutral organization



The socio environmental commitment

Objective:

 Protect and conserve the water resources of the Panama Canal Watershed, both in quantity and quality, for the operation of the Panama Canal and to provide potable water to the population

Components:

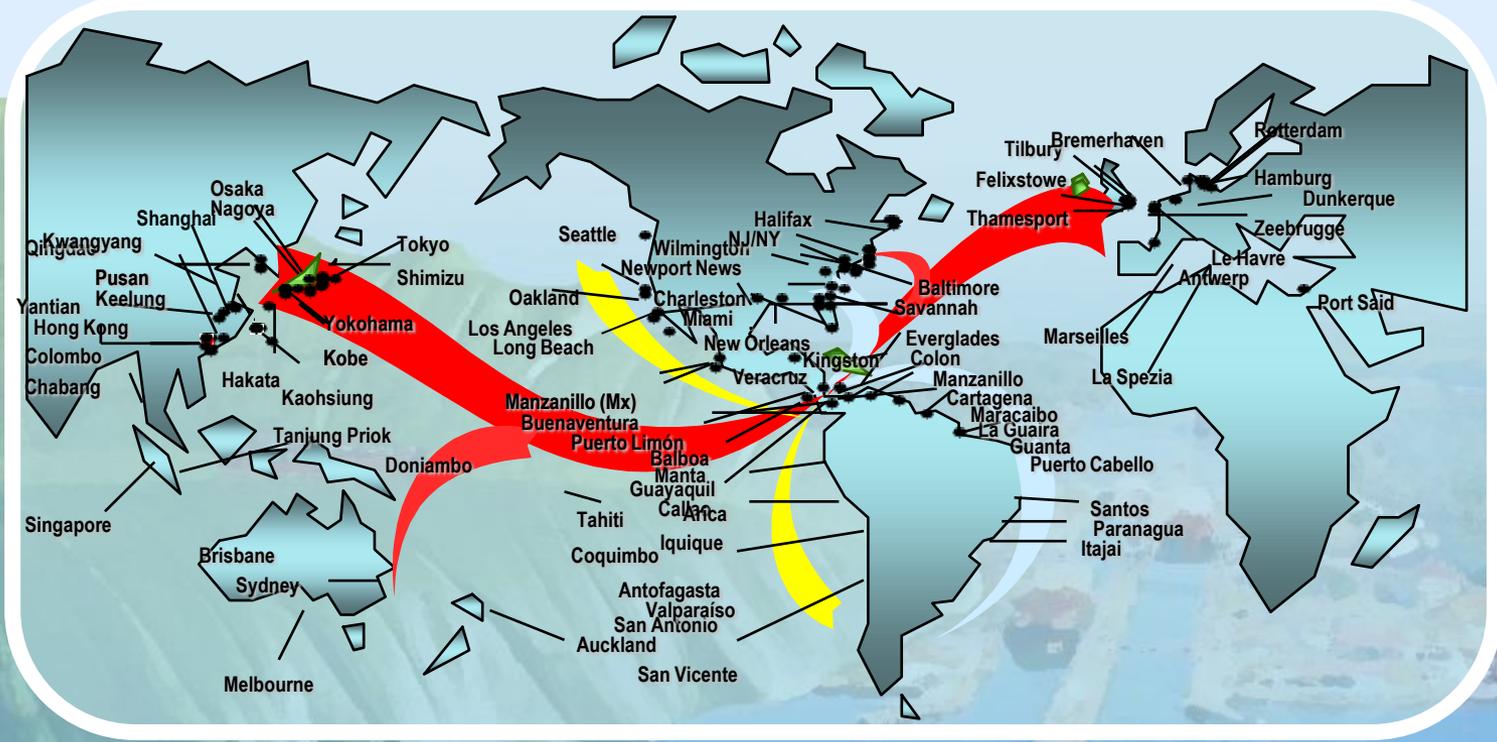
-  The protection of the existing forest cover and the promotion of sustainable land use
-  The reconversion of degraded areas
-  The inclusion of activities of commercial reforestation

Component	Scheme	Sub-scheme	Activity	Area (hectares)
Protection	Forest conservation		Conservation	11,000
	Regeneration		Conservation	2,000
Sub total				13,000
Reforestation and agroforestry	Agroforestry plantations	Agroforestry	Conservation	1,290
		Silvopastoral	Conservation	1,232
	Forest plantations	Continuous areas	Commercial	1,500
		Enrichment	Conservation	2,485
Sub total				7,000
Total				20,000

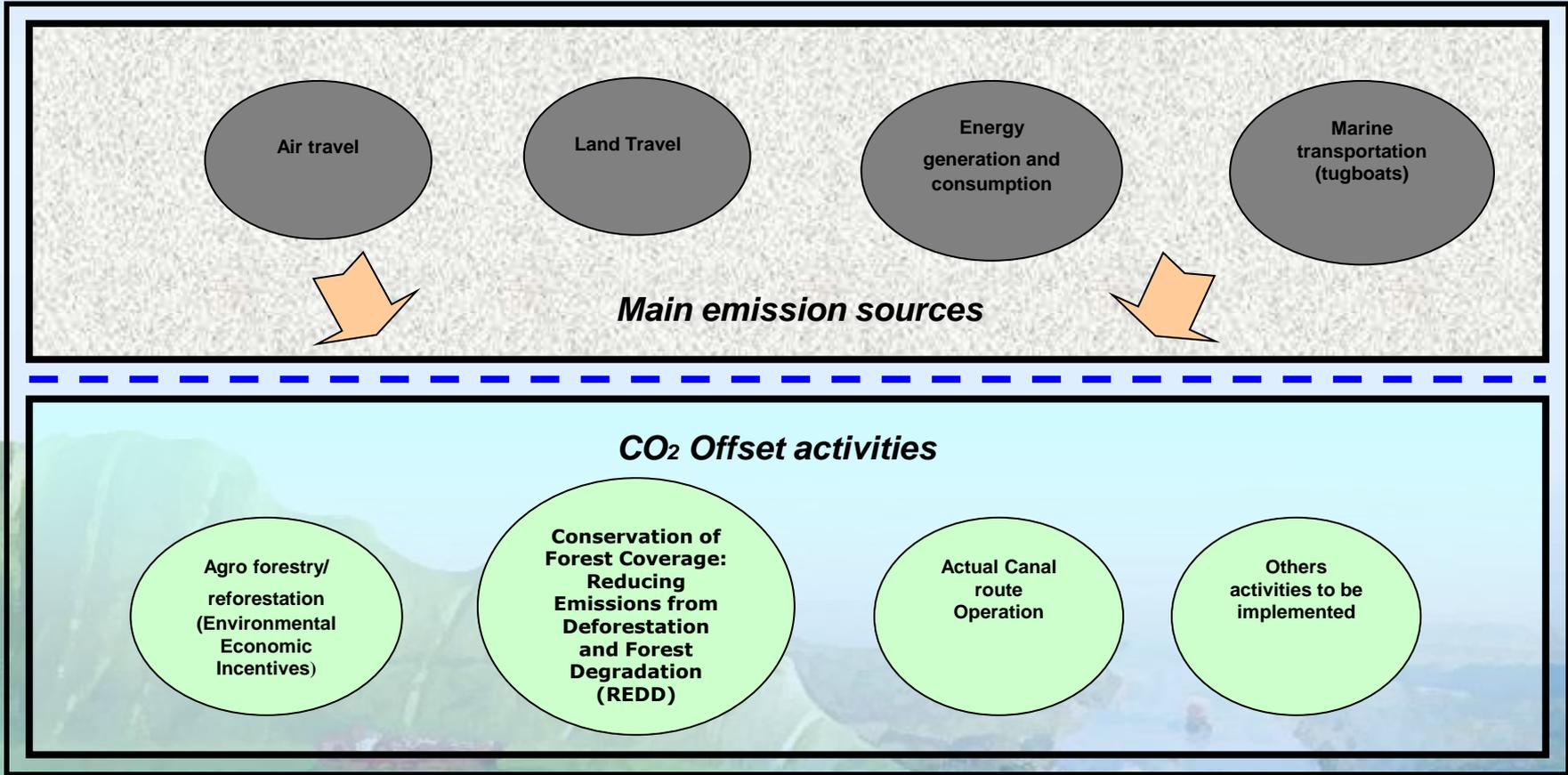


Mitigation of global CO2 emissions by the Panama Canal route

-  The Panama route enhances environmental contribution by reducing GHG emissions on the planet:
-  More efficient transport, reducing fuel consumption per cargo unit
-  All-water route causes fewer emissions than other routes that combine transportation by land



Establish ACP as a carbon neutral organization



The ACP seeks to become a carbon neutral organization to fulfill its vision of being global leader in services for the maritime industry and sustainable development for the conservation of the Panama Canal Watershed

Kg/TEU/Km

CO₂ Emissions Comparisson

0.119

4,800 TEU



1 10,000 TEU ship is equivalent to:

0.447

400 TEU



25 Feeder Barge

0.673

80 TEU



18 8,000 fool long trains (27 miles)

2,296

2 TEU



5,800 Trucks (60 miles)



570 Boeing 747

The Panama Canal in World Maritime Industry



A leader in the World Merchant Fleet: World's largest shipping registry



One of ten Council IMO Members with the largest interest in providing international shipping services



Maritime services to 6% of World Commerce



Panama Canal offers high standards of efficiency, safety and reliability



Panama is a Hub for global shipping and trade



Panama Canal challenges

-  **Growth in transit demand and the maritime industry trend toward the deployment of larger vessels**
-  **Prevent saturation point to be reached, avoiding diversion of traffic to potentially longer alternative routes**
-  **To continue offering the safest and cost and time effective service for the World's commerce**
-  **Remain a World leader in sustainable development and ensure its operations comply with highest environmental standards**



The Green Route



The ACP has developed an innovative strategy to face the environmental challenges associated with the Panama Canal Expansion, the promotion of sustainable development activities in the Panama Canal Watershed and the reduction of emissions in the worldwide shipping industry



The Panama Canal Expansion Project will provide benefits to the international shipping industry, in terms of time and cost, as well as the CO2 emissions reductions in the planet



The all water route of the Panama Canal, with the sustainable management of its watershed, has been established as the Green Route of the world maritime commerce



Thanks for your attention

