

**5<sup>TH</sup> GEF INTERNATIONAL WATERS CONFERENCE**  
**CAIRNS, AUSTRALIA - October 2009**

GEF-UNDP-UNESCO

***Protection and Sustainable use of  
the Dinaric Karst Aquifer System  
(DIKTAS)***



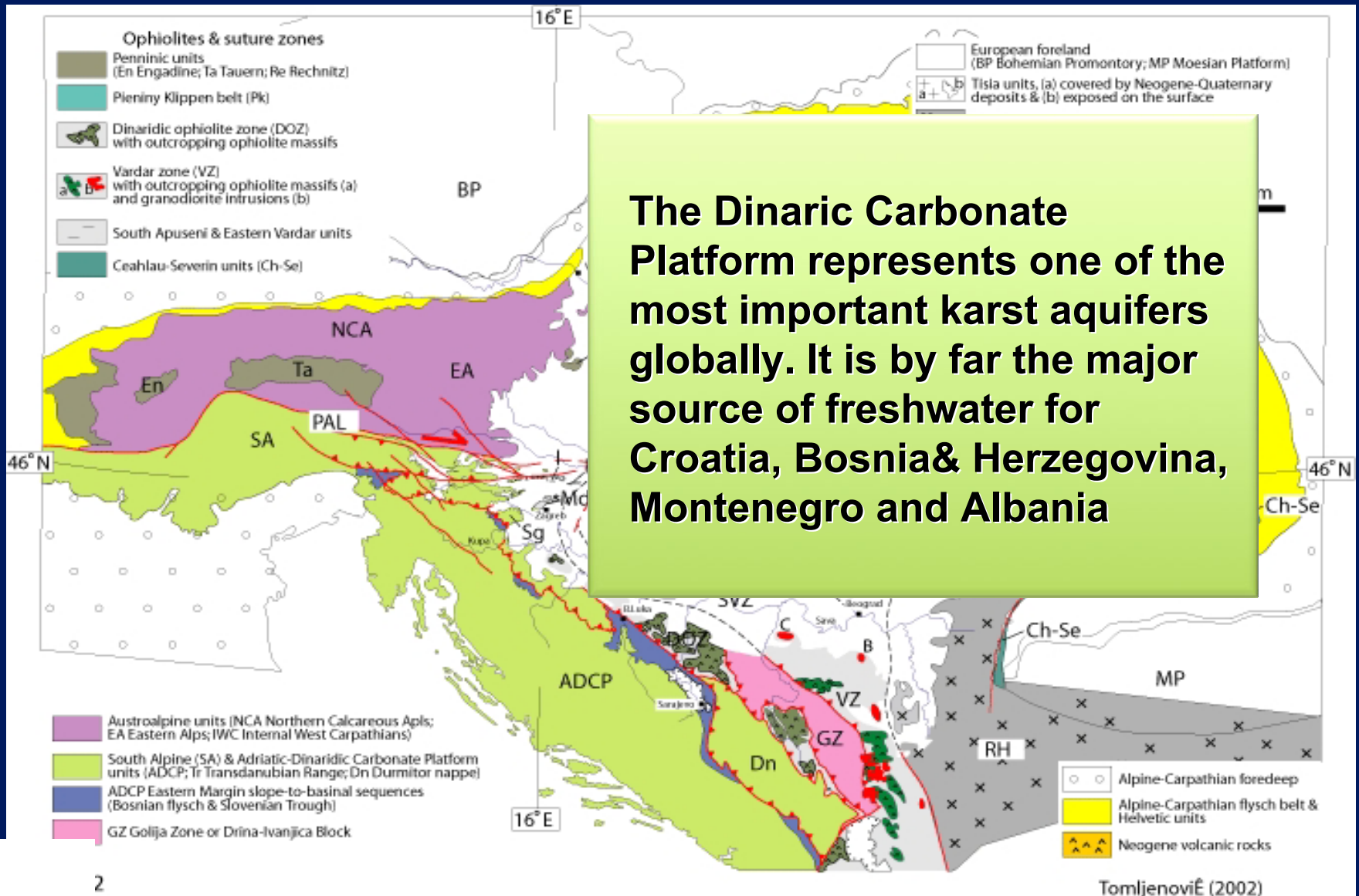
**The term “karst” is applied to a specific geological landscape and morphology that develops wherever limestone formations, or other carbonatic rocks, constitute the bulk of the geological substratum of a region and outcrop over extensive areas. Due to their solubility, these rock formations develop high permeability along fractures and faults, with the formation of sinkholes, chasms, underground streams, and caves**

**What is  
karst?**

**“Karst” hydrogeology is characterized by high fracture controlled permeability, almost total absence of surface drainage (which has been largely diverted into subterranean routes), high infiltration rates and rapid underground flows of groundwater.**



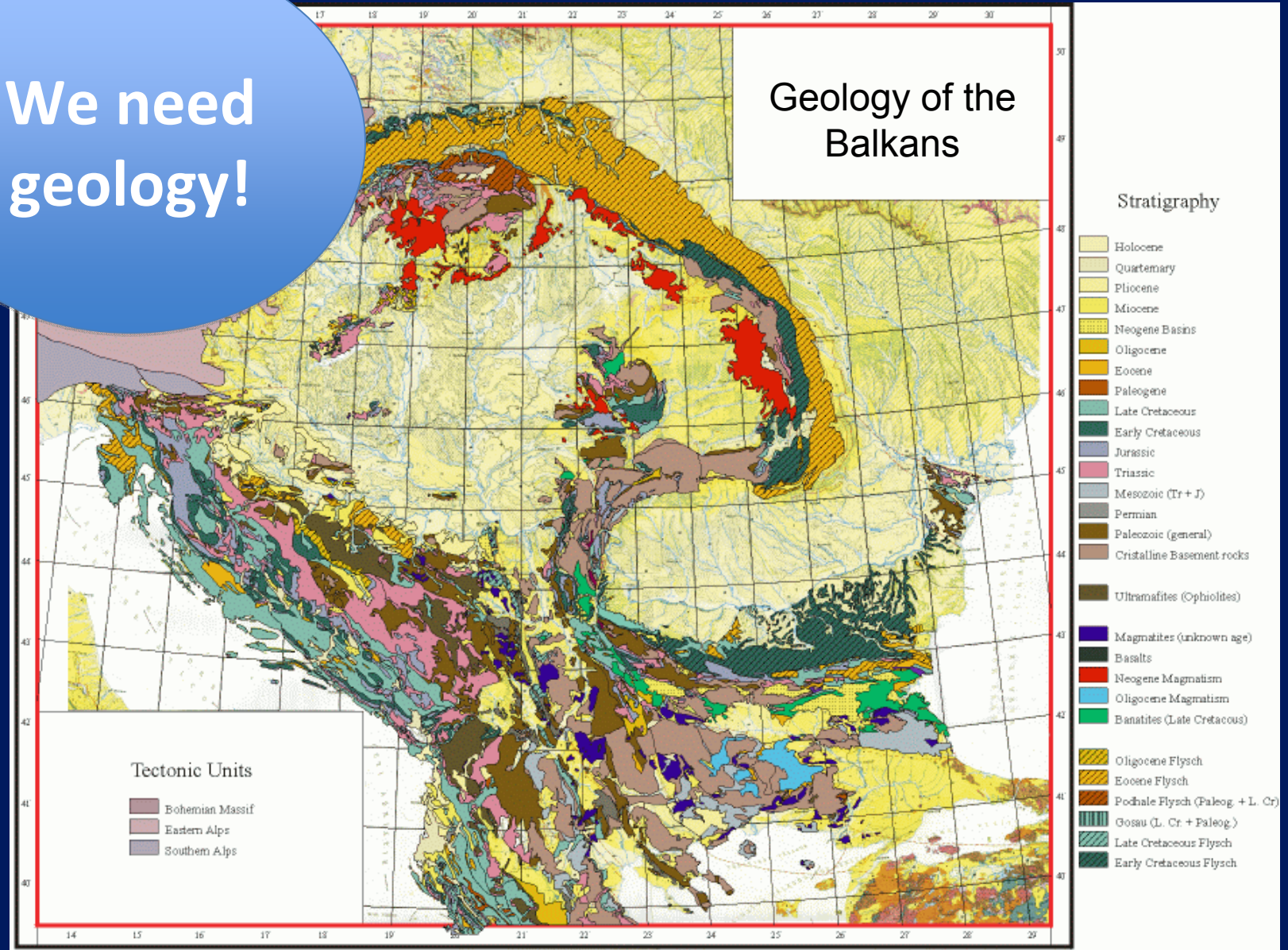
# THE PROJECT AREA





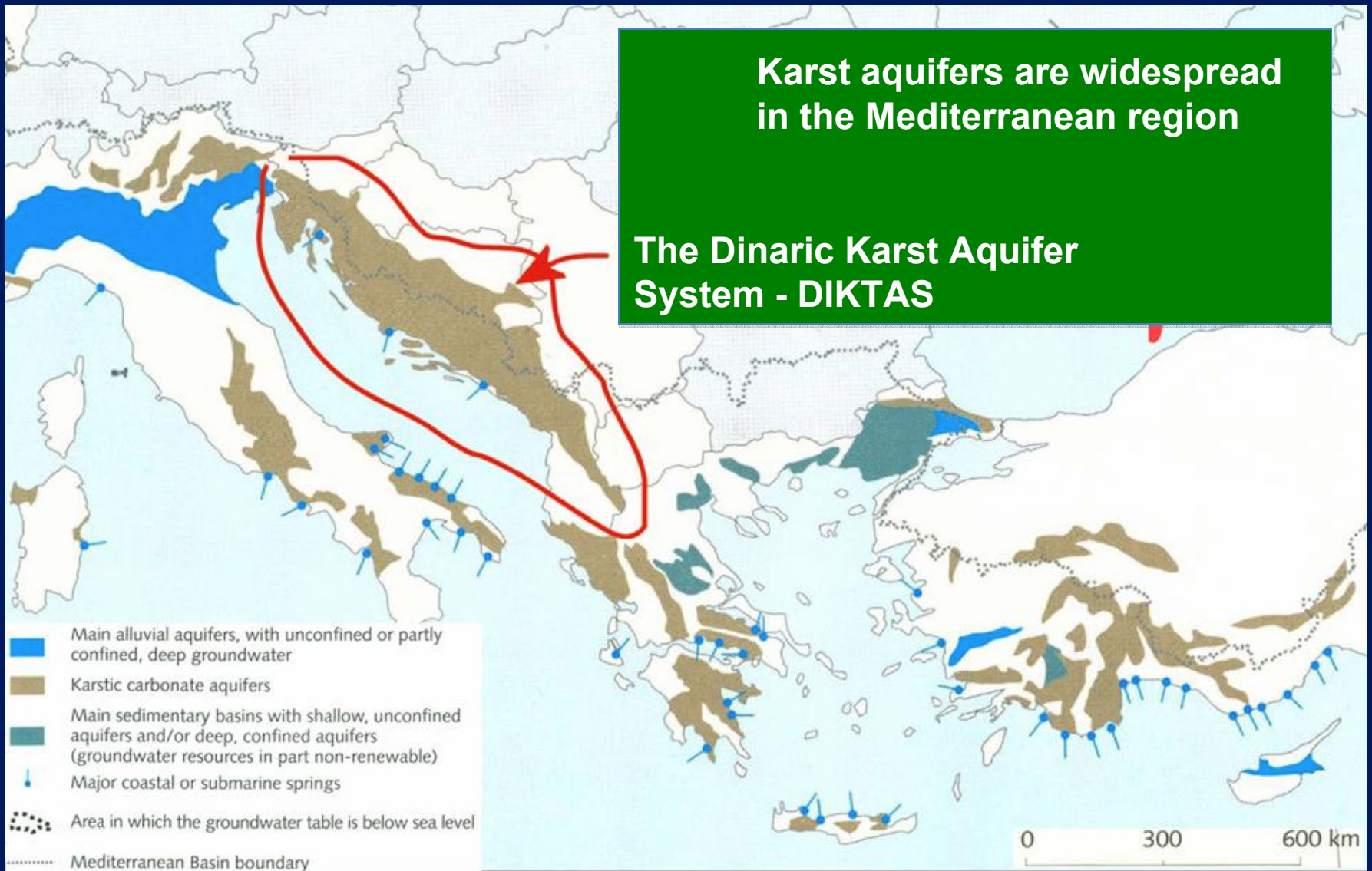
We need  
geology!

## Geology of the Balkans



**Karst aquifers are widespread  
in the Mediterranean region**

**The Dinaric Karst Aquifer  
System - DIKTAS**





**The dominant groundwater flow is towards the Adriatic and Ionian Seas, while the Eastern extension of the karstic chain drains to the Sava river basin.**

**The gradient is steep, descending from well over 1000 m of altitude, down to 100-200 m asl, creating a very favorable environment for hydropower generation.**





## The Karstic Landscape of the Project Area



**Groundwater eventually enters the coastal area through few rivers (Neretva, Cetina, Trebisnjica, and others) and more importantly through strong submarine groundwater flows that characterize the coastal areas of Istria and Dalmatia.**

**The total amount of groundwater entering the coastal environment with its load of nutrients and other contaminants is not known, but certainly very large: it is estimated that karstic groundwater is the largest source of freshwater entering the Adriatic Sea.**





**Identifying clear distinctions between groundwater and surface water in a karstic geological environment is hardly feasible and probably meaningless in terms of water resources management.**

**The simple setting up of River Basin Authorities or Agencies in application of international guidelines, or of the EU Framework Directive, will not *per se* allow the integrated surface-groundwater management essential to reach sustainability.**



# The challenge

The rise of several new sovereign states from what was once one nation determined complex transboundary inter-linkages that impact water use and water sharing for power generation, agricultural, domestic and other purposes between bordering countries.





## Transboundary Issues in DIKTAS region

- (i) lack of full understanding of the the resource, and of recognition of the system boundaries**
- (ii) lack of a conceptual framework for balancing the various demands on the resources;**
- (iii) the lack of harmonized multi-country policies regulating land-use and physical planning throughout the karstic region in view of the aquifer's high vulnerability to contamination;**
- (iv) the negative impacts of hydraulic infrastructure that are causing conflicts among user/regions/countries;**
- (v) the potential impacts of climate change, such as excessive variability in rainfall patterns, flooding etc.**



# HOW WE GOT HERE





# **THE PROJECT's GLOBAL OBJECTIVES**

**The project is the first ever attempted globally to introduce sustainable integrated management principles in a transboundary karstic freshwater aquifer of the magnitude of the Dinaric Karst System.**

**The Dinaric Karst Aquifer System, shared by many countries and one of the world's largest represents an ideal opportunity for applying new and integrated management approaches to these unique freshwater resources and ecosystems.**



**At the global level the project aims at focusing the attention of the international community on the huge but vulnerable water resources contained in karst aquifers which are widespread globally, but poorly understood.**



**The project will address in particular the three main issues that require priority attention:**

**Water quality: protection of recharge areas**



**Harmonized land use planning policies; incentives for reforestation; etc.**

**Integrity of karst and coastal ecosystems: integrated management of hydraulic infrastructure**



**Towards multi-purpose infrastructures; ensuring environmental flows; control of coastal salinization**

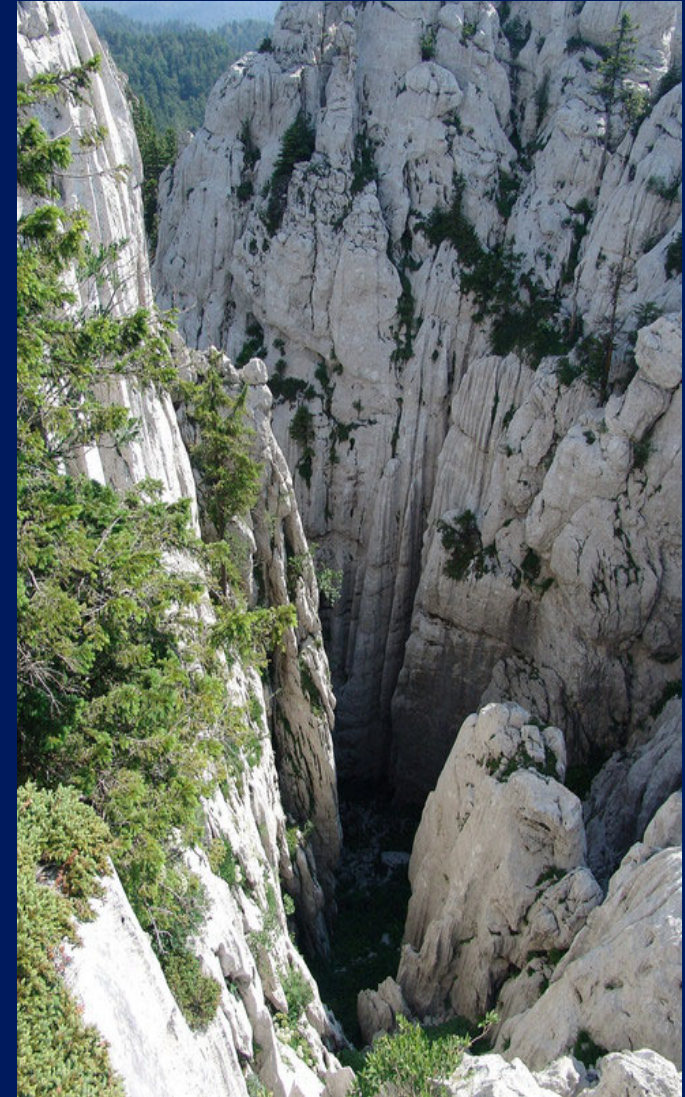
**Quality of lakes and coastal waters: reduction of nutrient runoff**



**Manure management and other agricultural practices; restoration/protection/construction of wetlands; WWTPs**

By doing this, the project will promote compliance with key international agreements and guidance. Among them:

- The World Summit on Sustainable Development Plan of Implementation and its IWRM target
- The Barcelona Convention and its Protocols
- The EU Water Framework Directive
- The EU Directive on the Protection of Groundwater Against pollution and Deterioration



# THE PROJECT's REGIONAL OBJECTIVES

1

To improve in all countries sharing the aquifer, the understanding of the groundwater resources of the Dinaric Karst Aquifer System

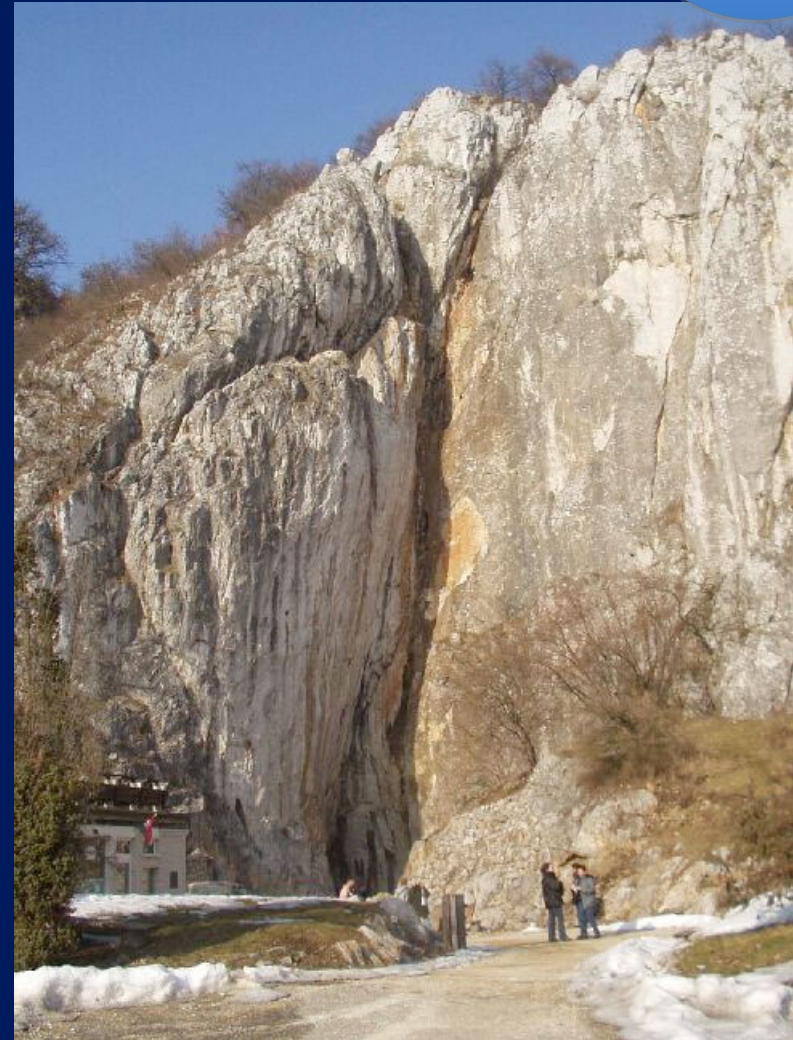




# THE PROJECT's REGIONAL OBJECTIVES

2

**To facilitate the  
equitable and  
sustainable  
utilization of the  
water resources of  
the Dinaric Karst  
Aquifer System**



Andrea Merla

# THE PROJECT's REGIONAL OBJECTIVES

3

**To protect the  
unique  
groundwater  
dependent  
ecosystems  
that  
characterize  
the Dinaric  
Karst region**





**The wetlands of the  
Neretva Delta**





## EXPECTED OUTCOME 1

**COUNTRIES RECOGNIZE THE KARST AQUIFER SYSTEM AS A SHARED AND HIGHLY VULNERABLE RESOURCE, AND AGREE TO TAKE STEPS TO DEAL WITH ITS TRANSBOUNDARY IMPLICATIONS**



**A Transboundary Diagnostic Analysis (TDA)  
prepared and approved by countries:  
transboundary problems and root causes  
identified and options for interventions to address  
national and trans-boundary problems proposed**

## **Map of the Dinaric Karst Aquifer System TDA - Transboundary Diagnostic Analysis**



**Testing of management models or approaches at the local level with increased awareness, improved management capacity, and knowledge generated and utilized by local communities**

**Cooperation with the GEF Small Grants Program**

**Pilot demonstration sites/areas/sub-systems of the DIKTAS**





**Baseline conditions identified, and environmental status indicators agreed upon and adopted:  
Countries agree on a common vision for the DIKTAS, and join forces in a long term monitoring effort**

**SHARED VISION**

**ENVIRONMENTAL  
STATUS INDICATORS**



## EXPECTED OUTCOME 2

**THE STRENGTHENED COLLECTIVE KNOWLEDGE AND COORDINATION AMONG DEVELOPMENT PLANS OF COUNTRIES, PROJECTS, AGENCIES AND DONORS, IMPROVES SUSTAINABILITY OF THE RESOURCE**

**ESTABLISHMENT OF A CONSULTATION AND INFORMATION EXCHANGE BODY (CIE)**



## SYSTEMATIC COORDINATION WITH OTHER PROJECTS IN THE REGION

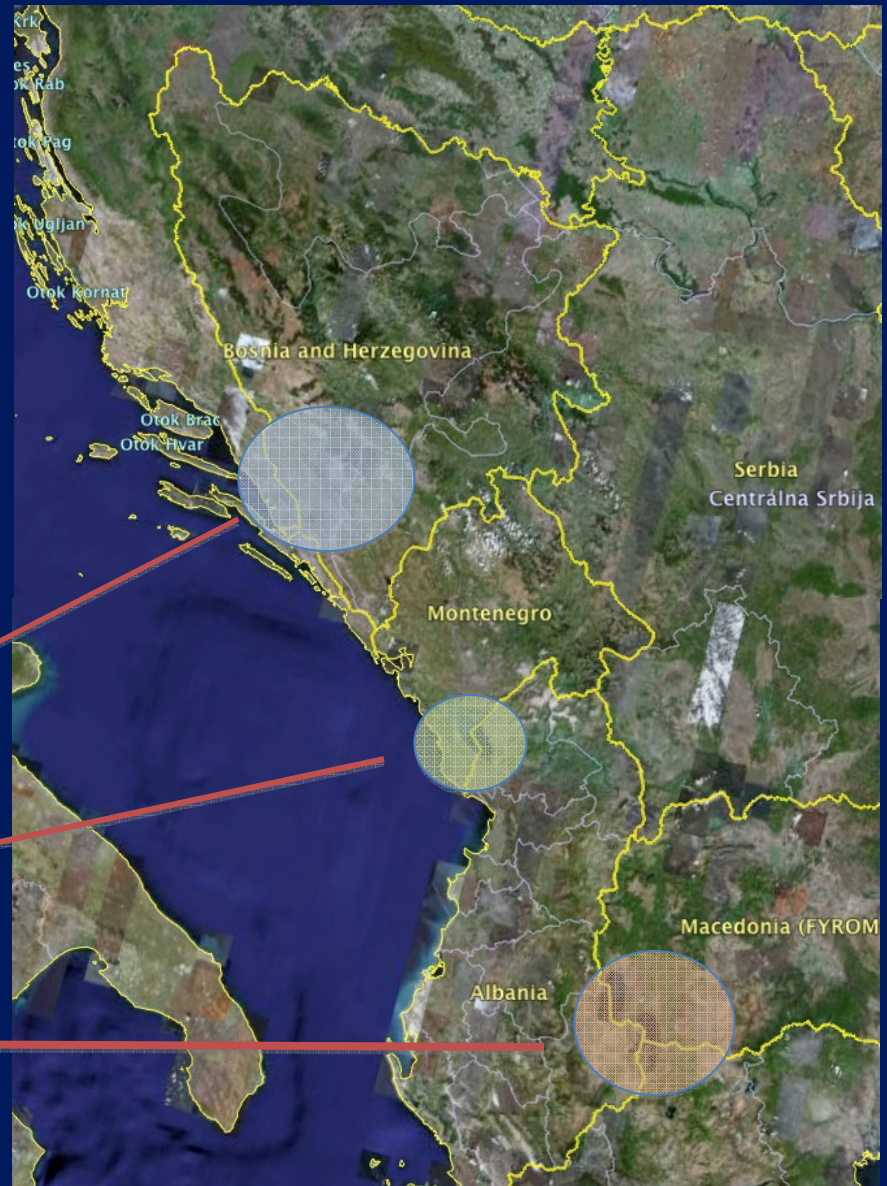
Among them the  
following GEF funded  
activities

Mediterranean Coastal Aquifers , a  
Component of the Mediterranean  
Partnership – UNEP-UNESCO

Neretva and Trebisnjica Basin  
Management – World Bank

Lake Shkodra Ecosystem  
Protection – World Bank

Lake Ohrid and Prespa  
Management – World Bank





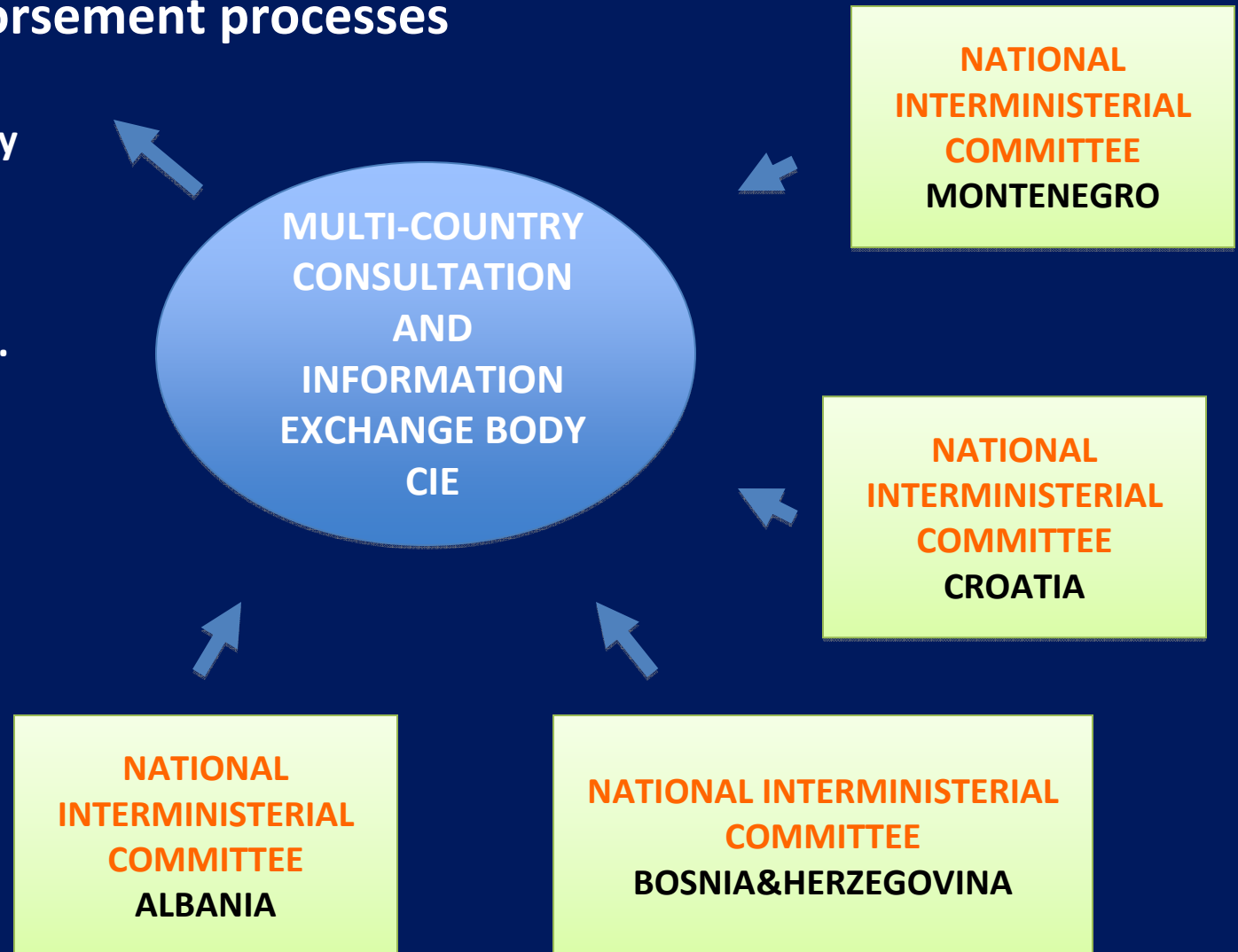
## EXPECTED OUTCOME 3

**POLITICAL COMMITMENT  
REACHED AMONG  
COUNTRIES ON  
IMPLEMENTING PRIORITY  
LEGAL, INSTITUTIONAL AND  
POLICY REFORMS FOR THE  
PROTECTION AND  
EQUITABLE UTILIZATION OF  
THE KARST AQUIFER SYSTEM**



# TDA Approval and Strategic Action Program endorsement processes

Commitment to  
Environmental Quality  
Objectives (EQO),  
Environmental Status  
Indicators and their  
long term monitoring.




## EXPECTED OUTCOME 4


LONG TERM SUSTAINABILITY  
OF ACHIEVEMENTS  
ENHANCED THROUGH PUBLIC  
AND POLITICAL AWARENESS  
CAMPAIGNS, STAKEHOLDER  
INVOLVEMENT AND  
REPLICATION MECHANISMS



Edwards Aquifer Authority



**The Edwards Aquifer**  
Manage, Enhance, Protect




**Today's Lead**  
691.0  
(Bexar County Index Well)  
Updated on 1/17/2007  
Go to Other Wells and Springflow Rates

**EDWARDS AQUIFER AUTHORITY BOARD APPOINTS NEW GENERAL MANAGER**  
Long-time Deputy GM Danielson Named to Fill Top Post

**SAN ANTONIO (August 14, 2007)**  
The Edwards Aquifer Authority Board of Directors, at its regular meeting August 14, voted to name long-time deputy general manager Robert R. Danielson as the agency's next general manager. Danielson, who has been with the agency since 1998, will officially assume the responsibilities of general manager on September 1, 2007. A formal employment contract is approved, and the transition of the agency's general manager through the end of the month to facilitate the transition in leadership. More

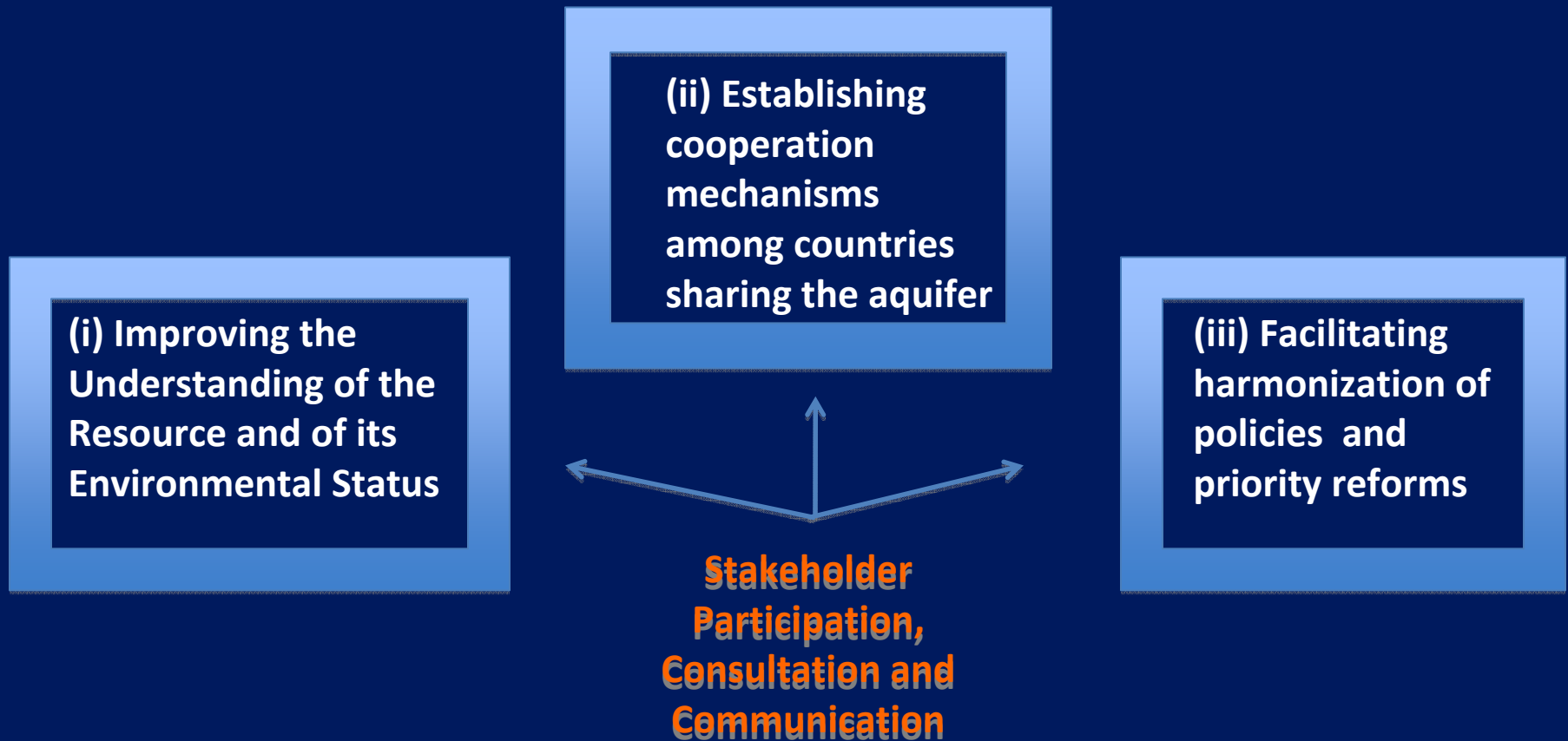
The Edwards Aquifer Authority manages, enhances, and protects the Edwards Aquifer, one of the major groundwater systems in Texas serving approximately 1.7 million people. This expansive, natural underground water resource extends 180 miles from Brackettville in Kinney County to Kyle in Hays County. While the Edwards Aquifer serves as the primary source of water to a growing region of south central Texas, it also supports a unique ecosystem of aquatic life, including several threatened and endangered species. Cities, towns, rural communities, and farm and ranch lands all depend on the aquifer's water for household, agricultural, industrial and recreational purposes. This diversity of uses illustrates the vital role the aquifer plays in sustaining the lives and livelihoods of residents in the Edwards Aquifer region.

MEETINGS, HEARINGS & WORKSHOPS	JUST ADDED	PHOTO GALLERY
<ul style="list-style-type: none"><li>Board Meetings</li><li>Committee Meetings</li><li>Meetings and Hearings</li><li>Authority Workshops</li></ul>	<ul style="list-style-type: none"><li>Dr. Calvin Alexander Lecture</li><li>Notice of Public Hearings</li><li>2008 Proposed Budget</li><li>EAA Act</li><li>Article 12</li><li>Well Registration Form</li><li>Range Management</li><li>Cost Share Program</li><li>2006 Annual Report</li></ul>	<a href="#">Go to Photo Gallery</a> 

<http://edwardsaquifer.org/Today.asp>



**The Stakeholder Participation, Consultation and Communication Strategy represents a key element of the project, and will be instrumental in the achievement of all project objectives and outcomes.**





**Thank you!**