

# “proKARSTerra–Edu” – A KARST-EDUCATIONAL PROJECT



www.prokarsterra.bas.bg

Petar Stefanov<sup>1</sup>, Dilyana Stefanova<sup>1</sup>, Dimitrina Mikhova<sup>2</sup>, Leoš Štefka<sup>3</sup>

<sup>1</sup>National Institute of Geophysics, Geodesy and Geography – BAS, Acad. G. Bonchev str., bl. 3, Sofia 1113, Bulgaria, psgoo@abv.bg  
<sup>2</sup>Department of Cross-Cultural Studies, Faculty of Education, Yamaguchi University, 1677-1 Yoshida, Yamaguchi city 753-8513, Yamaguchi Prefecture, Japan, didi@yamaguchi-u.ac.jp  
<sup>3</sup>Agency for Nature Conservation and Landscape Protection of the Czech Republic, Administration of Moravský kras Protected landscape area, 678 01 Blansko, Svitavská 29, Czech Republic, leos.stefka@nature.cz



## Abstract

The wide distribution of karst makes topical issues concerning its use and management with a view of sustainable development of these territories. The solution to the problems related to karst depends on effective education and training concerning karst specifics. In this respect protected karst territories acquire high importance: they can serve as sites for karst education so as test grounds for developing models of rational land use in karst environment.

This paper presents a strategy of karst education, entitled proKARSTerra-Edu. Exemplified by model PKT, it integrates the contemporary research concept of “Karst geosystems” (supported by karst cadastre, developed as a result of complex monitoring and data management in GIS environment) and the educational concept of “Life-long education”, proKARSTerra-Edu is a part of a pilot model of a methodological platform for modern management and conservation of protected karst territories (based on representative karst geosystems in Bulgaria, the Czech Republic and Japan)

## 1. Introduction

Karst occupies a significant part of the Earth's land (about 12 %, Fig. 1) and this specific environment is closely related to the lives of millions of people. In Bulgaria karst is not just a phenomenon of tourist attraction. Because of its wide distribution (ca. 23 % of this country, Fig. 2) and heterogeneous diversity, it makes a specific natural environment, inhabited since ancient times. For millennium both the karst landscapes and people have had mutual impact on each other. Human impact on karst reached especially large scale during the recent decades of increasing economic growth.

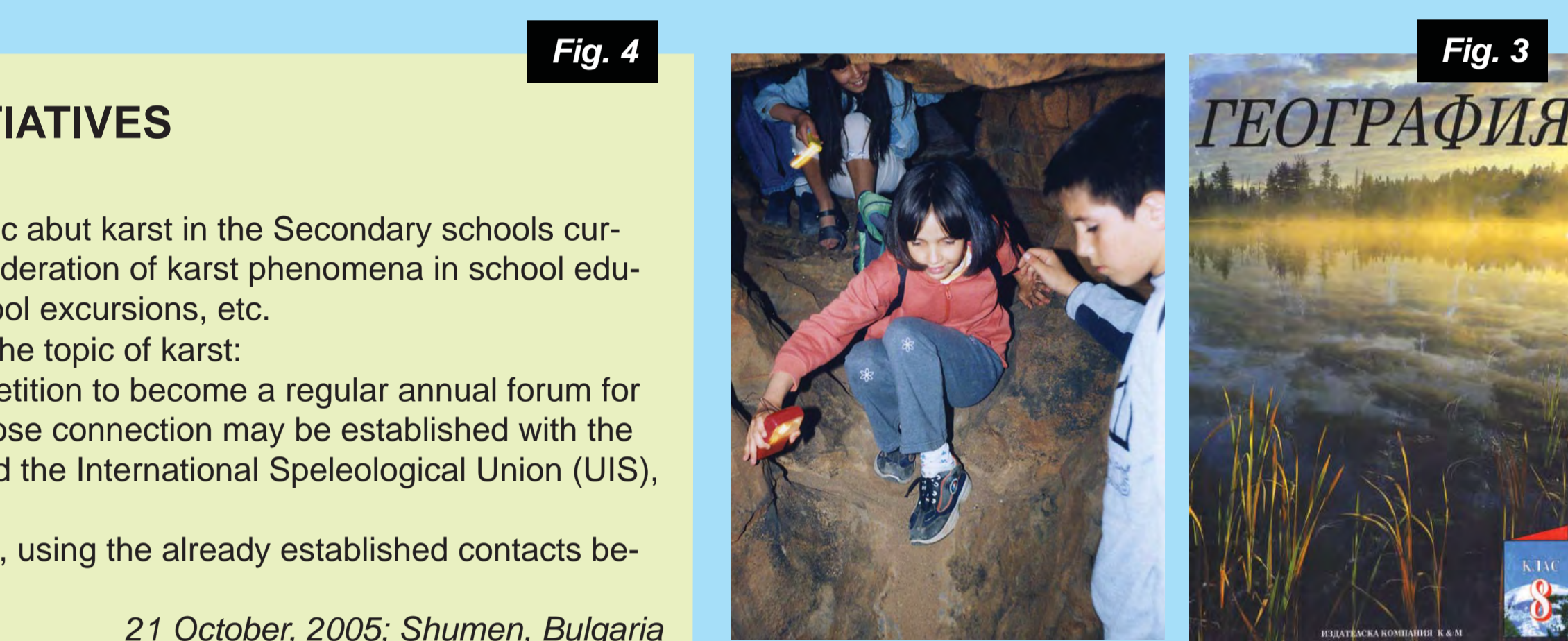
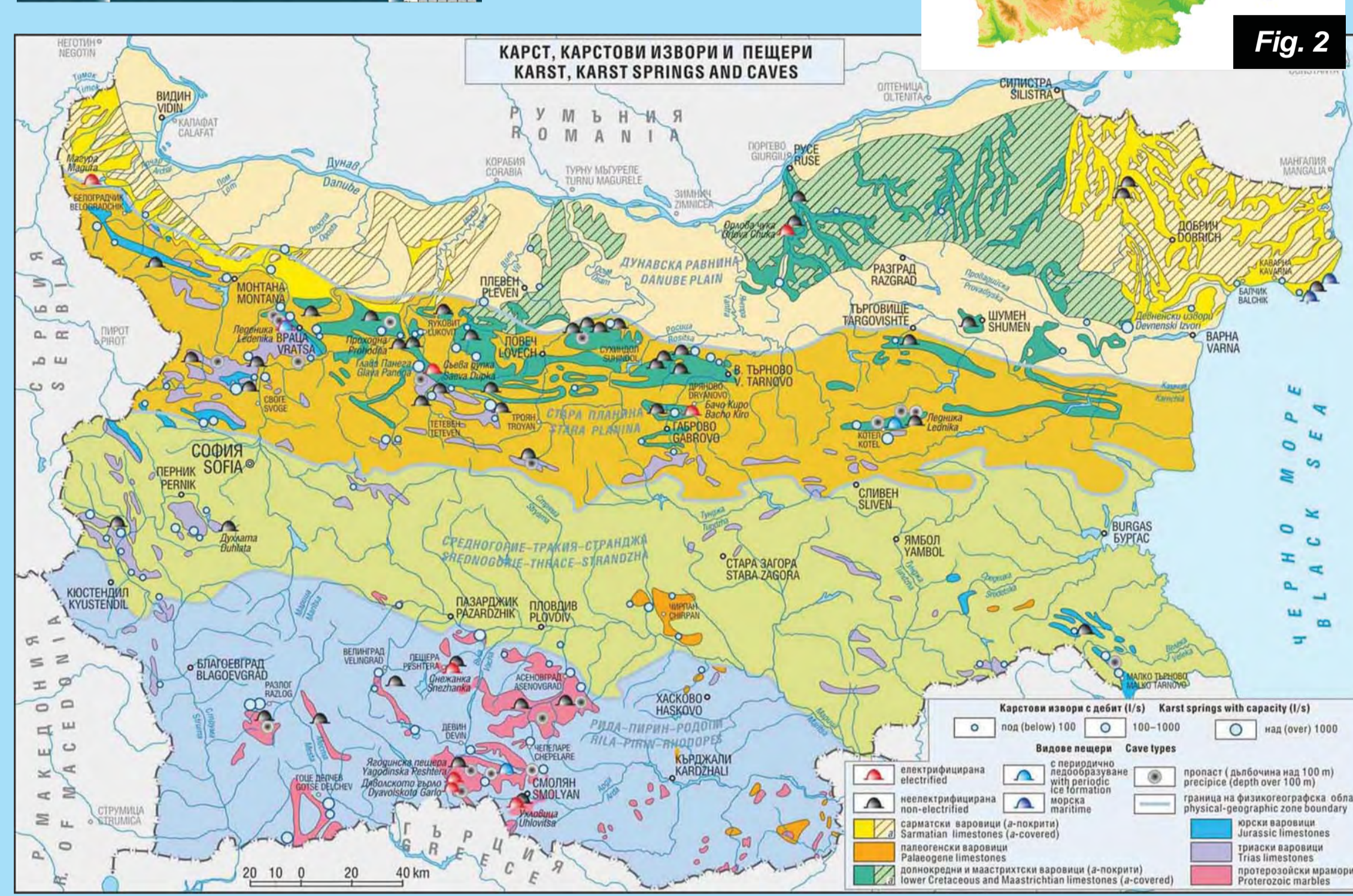
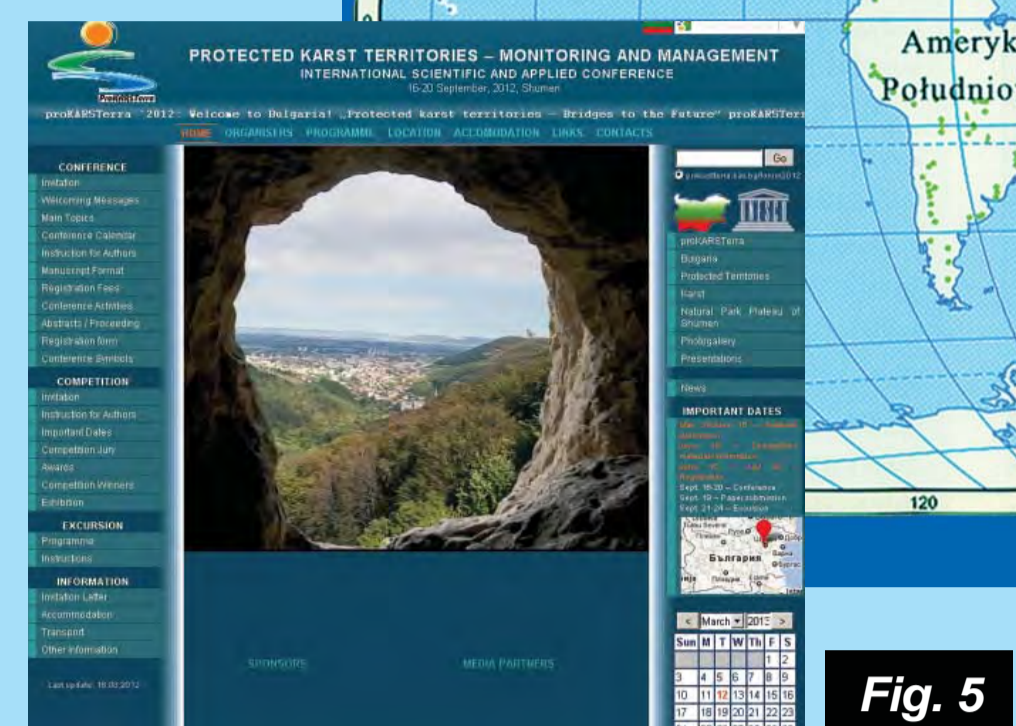
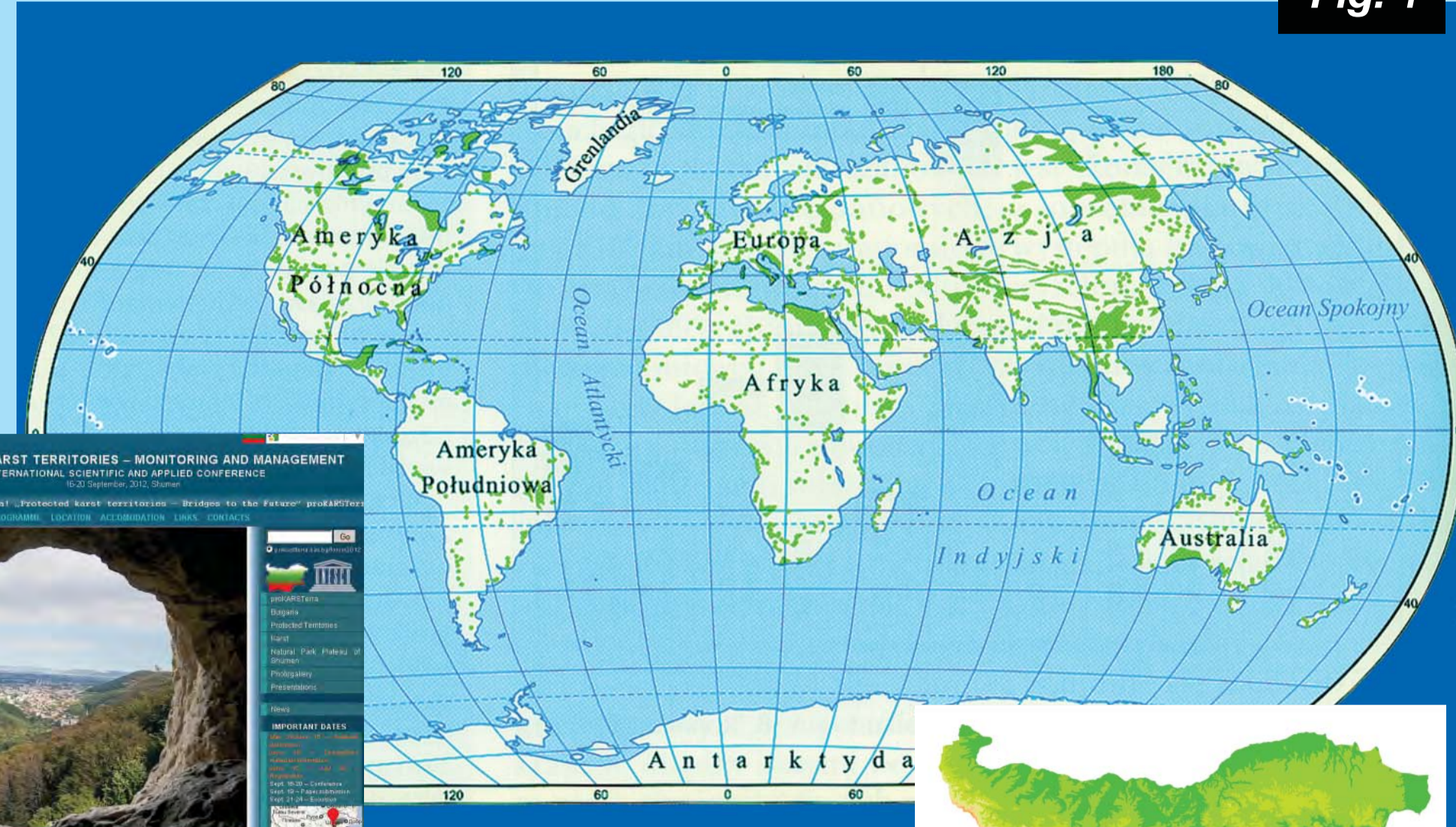
Serious problems have been revealed in the management and control of karst territories, the society not being aware of it's. It is getting clear that these problems are associated with serious gaps in education and training about karst at all levels – from school to University, at state institutions and specialized institutions that manage karst areas. Paradoxically, at the same time the interest in Karst and Speleological research is increasing, leading to publications. Work in karst education is also insufficient at the largest international organizations, such as the Geographical and Speleological ones. Based on this generally negative background some good educational practices concerning karst can be outlined (Zokates C, 2007; Brinkmann R, 2010; North L., van Beynen P, 2011 etc.)

In Bulgaria there are some best practices:

- The concept of Karst geosystems entered the Geography curriculum for 8<sup>th</sup> Grade in 1994 and was apprehensively explained in one of the approved textbooks (Geography for grade 8, Publ. House “K & M”, Sofia, 1995) (Fig. 3);
- The active research during the last 20 years as well as the experiments in representative karst areas in Bulgaria established research infrastructure and databases for training and education in karstology;
- In the Final Document of the International Conference on Karst research and management in Shumen, Bulgaria (18-21 October 2005, <http://prokarsterra.bas.bg/karst2005/>) has specific recommendations to the Bulgarian Ministry of Education and Science to optimize the topic of karst in educational programs (Fig. 4);
- One of the main topics at the Second International Karst Forum in Shumen (16-20 September, 2012, [www.prokarsterra.bas.bg/forum2012/](http://www.prokarsterra.bas.bg/forum2012/)) (Fig. 5) was the role and the importance of karst in the Education program;
- Actively develop international cooperation in the field of protected karst territories (PKT) (Fig. 6) and organizing and building scientific network proKARSTerra (located in Bulgaria);
- Bulgaria is the initiator and organizer of the International Competition for students “Karst under protection – a gift for future generations” (held in 2005 and 2012);
- In 2012 UNESCO approved and funded Bulgarian project “proKARSTerra – integration between the research concept of Karst geosystems and educational concept “Life-long education” (on the example of model protected karst areas)”.



## DISTRIBUTION OF KARST IN THE WORLD (by M.Pulina and W.Andrejczuk, 2000)

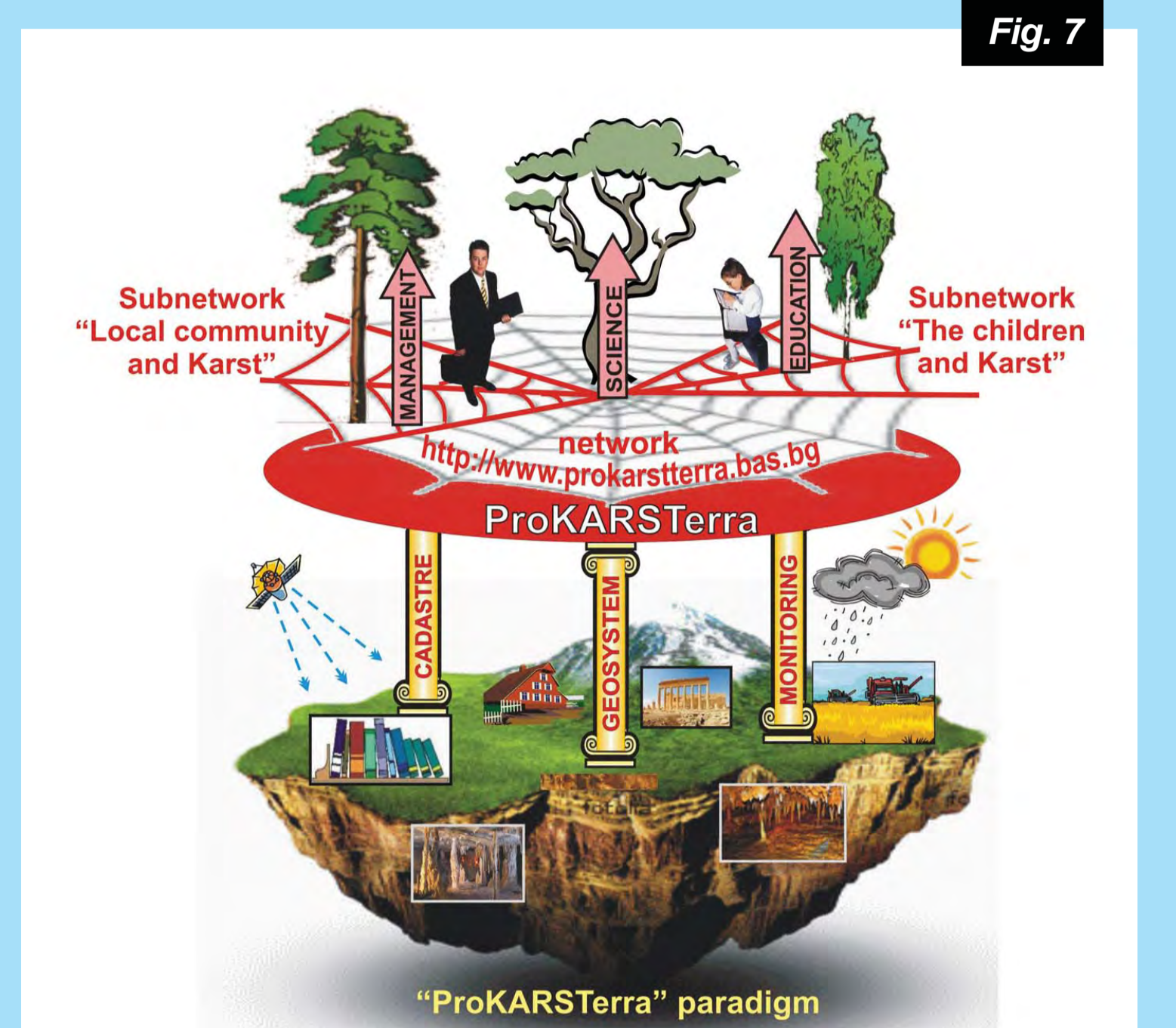


21 October, 2005, Shumen, Bulgaria

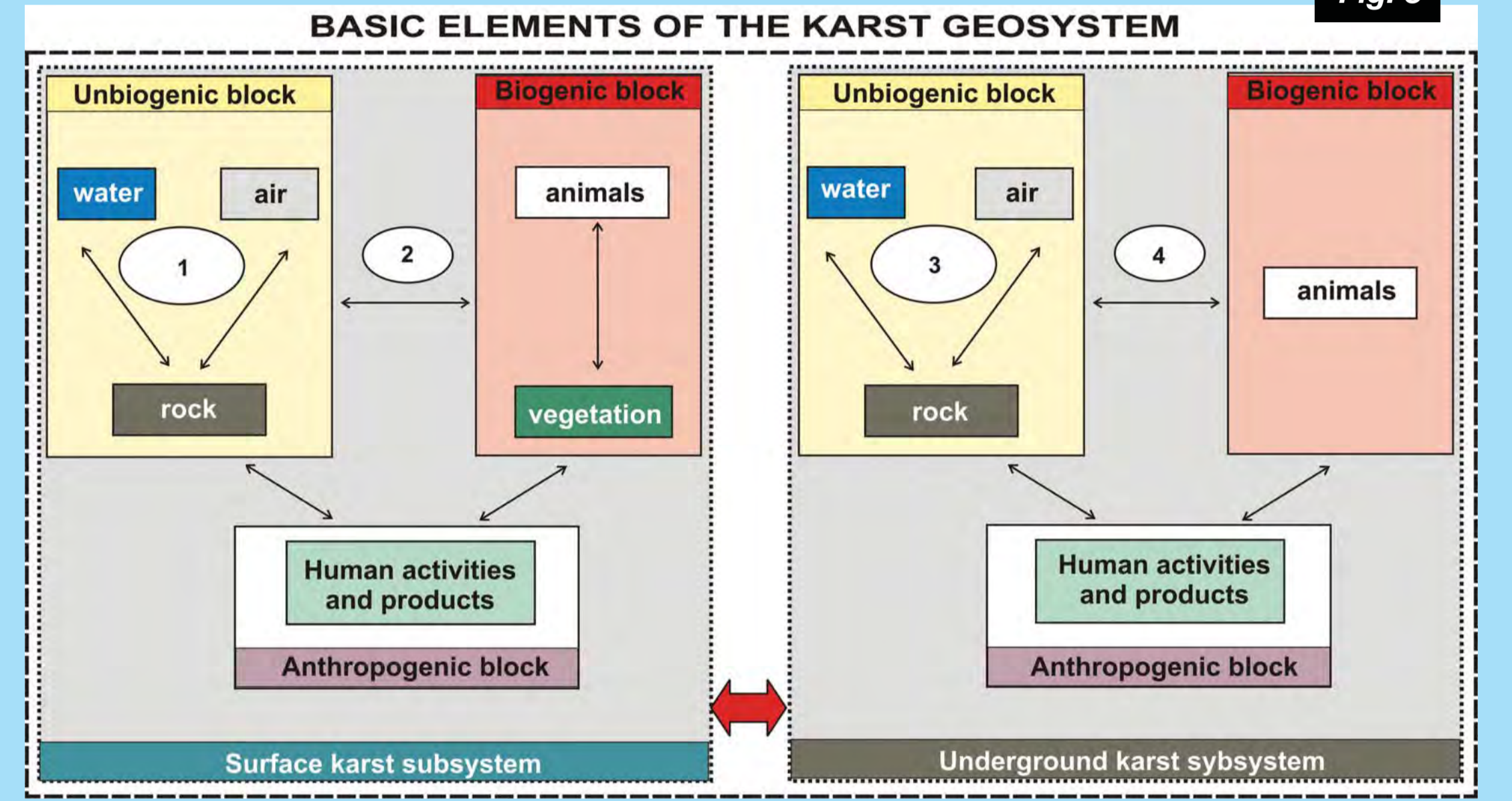
## 2. The proKARSTerra paradigm

Based on the experience gained along wide-range karst studies, the paradigm of proKARSTerra (Fig. 7) for protected karst territories (PKT) has been developed as a methodological platform for their modern management. It uses the Concept of Karst Geosystems (Fig. 8), the specialized information system of Karst Cadastre in GIS environment and the Complex Monitoring. A specialized open Internet network, proKARSTerra has been planned, aiming at coordination of the guidelines for development of PKT, namely building up the “Science-Management-Education” relationships. It is expected that this network will become a scientific and advisory center for administration of protected karst areas, which will be linked with the appropriate karst specialists. The designed information network proKARSTerra can be defined as a scientific and applied informational and communication network, as “proKARSTerra-Edu” is one of its important modules (Fig. 7)

- BUILDING UP AN INTERNATIONAL e-NETWORK “proKARSTerra” WITH FOUR MAIN MODULES:**
- Research
  - Monitoring
  - Management of protected karst areas
  - Training and education



## A CONCEPT OF THE KARST GEOSYSTEMS (by P. Stefanov, 1988; D. Mikhova and P. Stefanov, 1993)



- With numbers are marked the mixed (contact) elements:**
1. Karst forms, karst deposits, karst bulkhead layer;
  2. Soils, karst forms;
  3. Karst forms, karst deposits, karst bulkhead layer;
  4. Karst forms.

## 3.2. Main directions for development of the „proKARSTerra-Edu” strategy

1. Designing specialized information centers (including virtual ones) in model PKT. Designing special scientifically based educational path network for different types of demonstrations and field training (“in situ”). Establishing e-learning and dissemination of knowledge and information from the complex karst monitoring in real time (where it takes place).
2. Development and testing of specialized multipurpose karst educational program:
  - Development of a comprehensive concept;
  - Development of educational packages with accompanying educational materials
  - Development, piloting and public presentation of specific e-packages in GIS environment on various topics of Karstology
  - Organizing and conducting educational seminars and field demonstration in PKT, involving teachers and initiation of field lessons with students from different schools.
  - Arranging and conducting University students’ practices in the PKT network (including international) and attracting graduates in Karstology;
  - Organizing and conducting special training course for administrations of PKT and state administrations (“Life-long education”);
  - Designing, building, testing and maintaining of a special module “proKARSTerra-edu” in the scientific network “proKARSTerra”;
3. Organizing and building up an international network “University of Karst” (“Karst-Uni”) with specialized multipurpose infrastructure (with use of modern ICT and research equipment).
4. Dissemination of the results and opportunities for establishing National/International scientific-educational center of Karstology:
  - Preparation and publication of specialized scientific and methodological electronic journal “proKARSTerra” with international editorial board. Three sections can be developed, such as: science, management, education (materials will be published in several official languages);
  - Maintaining as traditional the already established international competition for students “Karst under protection – a gift for future generations” (organizer Bulgaria, international jury);
  - Organizing and conducting (Bulgaria, 2015) an International scientific forum “Protected karst territories – training and education”, to present and discuss models of integration between Karstology and current educational programs world-wide.

## CONCLUSIONS, RECOMMENDATIONS, INITIATIVES

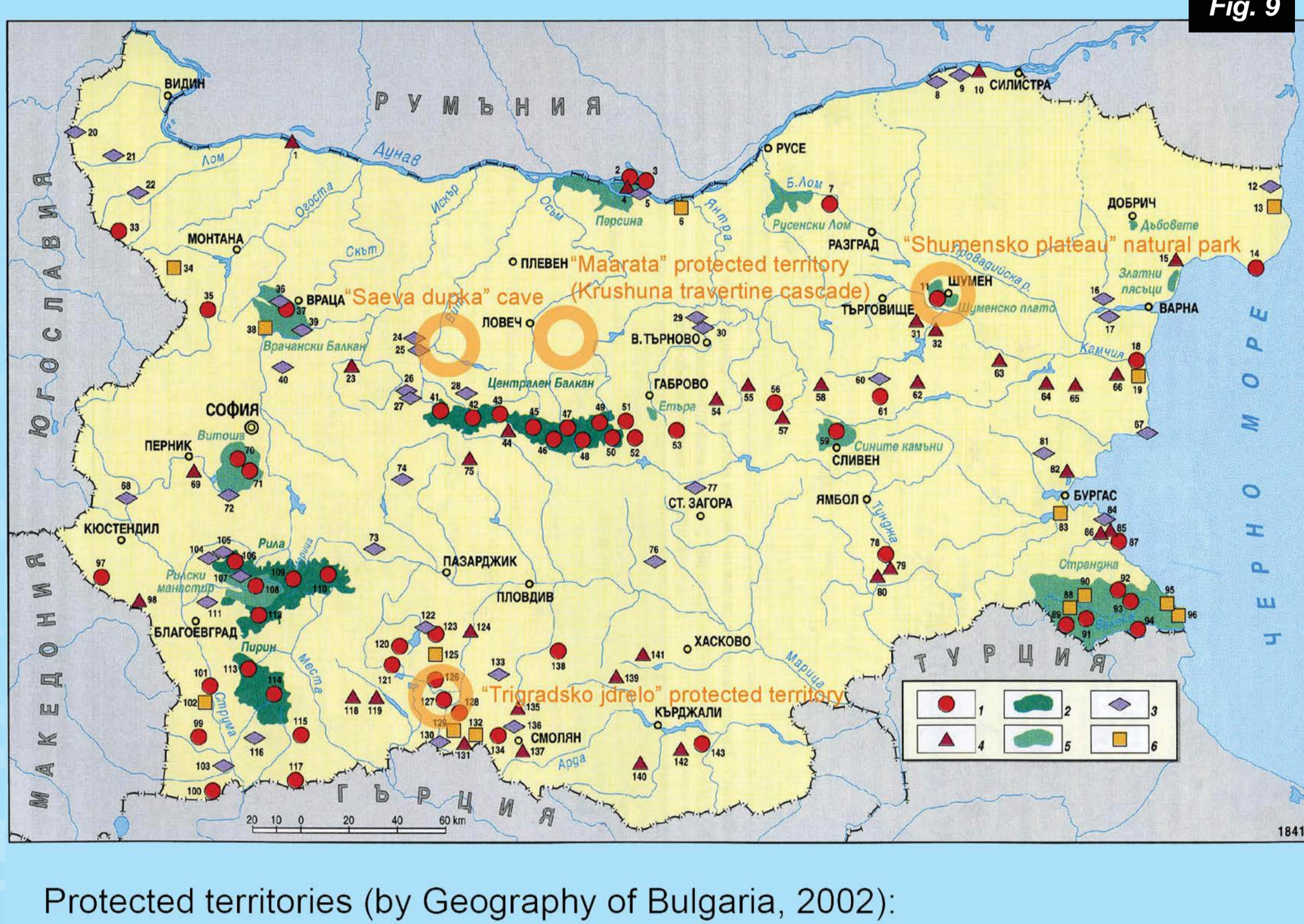
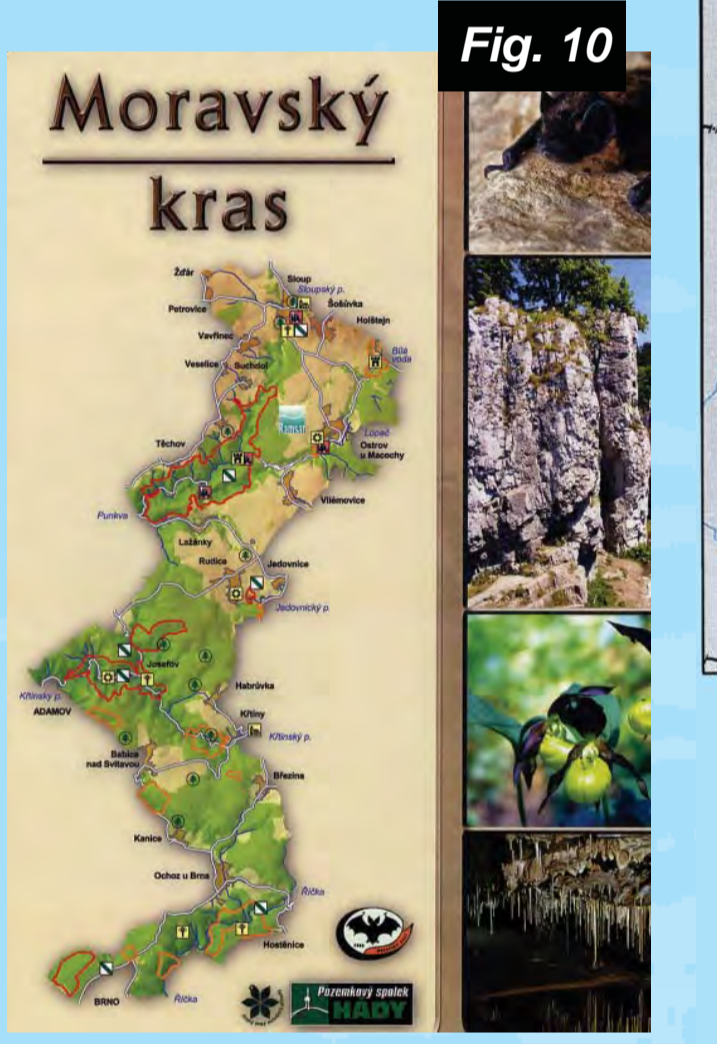
<http://prokarsterra.bas.bg/karst2005/>  
 ...To suggest to the Ministry of Education to reconsider the topic about karst in the Secondary schools curricula of Geography and Biology, aiming at more wide consideration of karst phenomena in school education, including through elective courses, green schools, school excursions, etc.  
 Two new international initiatives have been offered, aiming at attraction of children to the topic of karst:  
 - The “KARST UNDER PROTECTION: GIFT FOR THE NEXT GENERATIONS” competition to become a regular annual forum for pupils and their teachers to show their skills and knowledge about karst. For this purpose connection may be established with the respective educational commissions of the International Geographical Union (IGU) and the International Speleological Union (UIS), as well as other international organizations working with children.  
 - To begin setting up an international children's network “THE CHILDREN OF KARST”, using the already established contacts between Japanese and Bulgarian children through this conference...

## 3. proKARSTerra-Edu as a strategy

### 3.1. Strategy development

The strategy of proKARSTerra-Edu which is being experimentally developed in Bulgaria is one of the important aspects of Karstology in this country. Overall, the proKARSTerra-Edu strategy integrates the contemporary research concept of Karst geosystems with the modern educational concept of “Life-long learning”. At this point the experimental integration of both concepts in proKARSTerra educational model is based on international professional experience and exchange, developed research infrastructure and specialized information systems in model karst geosystems for PKT in Bulgaria (1. Natural park “Shumen plateau”; 2. Natural landmark “Maarata” – the biggest calcareous tuff cascade in Bulgaria; 3. Natural landmark “Saeva dupka” – the most visited Bulgarian show-cave; 4. Protected area “Ingrad Gorge” – with show-cave “Devil's Throat” (Fig. 9), Moravský kras Protected Landscape Area in the Czech Republic (Fig. 10) and Quasi-National karst park Akiyoshi of Japan (Fig. 11).

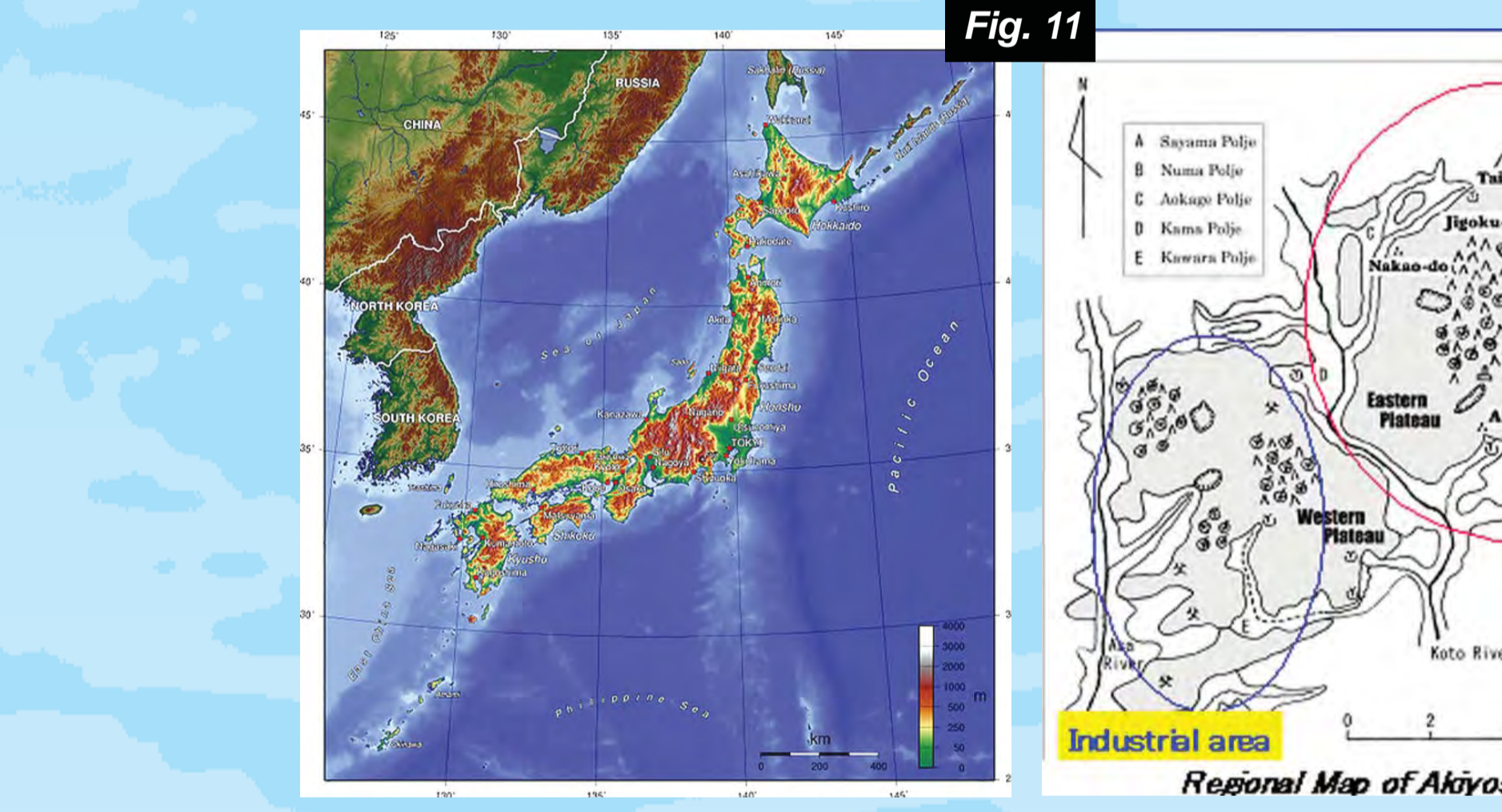
The choice of model karst geosystems in PKT in the proKARSTerra-Edu strategy has several arguments: it will help to promote specialization of PKT with their attractiveness, representation, tourist infrastructure, in PKT regulated protection, control and security has already been established, which is important for caves with the show-cave infrastructure, educational and research centers of Karstology, etc.



- Protected territories (by Geography of Bulgaria, 2002):
- 1 - reserve (R); 2 - national park (NP); 3 - natural landmark (NL); 4 - maintained reserve (MR); 5 - national park (NP); 6 - protected ground (PG)

## 4. Conclusions

The proKARSTerra-Edu strategy aims at creating new forms of linking the modern science and education in the field of karst as unique natural phenomenon, resource and living environment. The idea is to carry out this process in the protected karst territories.  
 At this stage the proKARSTerra-Edu strategy is being developed and experimented on a national level, but it is internationally open (including the planned e-network database). It is also open for discussions and new partners. It is clear that implementation of the ideas, set out in this strategy is a difficult and lengthy process requiring a lot of expertise, broad international cooperation and coordination. Therefore, it is largely supranational. The results of its implementation will be felt in the future and will be achieved by young people, interested in karst and having obtained their education through proKARSTerra-Edu. It might be an eventual success in promoting the idea raised in Bulgaria about declaration of an INTERNATIONAL YEAR OF KARST (with the assistance of UNESCO).



## International competition “Karst under protection – a gift for future generations”

The International competition “Karst under Protection, Gift for the Generations” is a part of the pilot educational strategy proKARSTerra-Edu, aiming at attracting young people from different countries and their knowledge about this sensitive natural environment and its problems. The competition is a Bulgarian initiative and has been held twice (2005 and 2012). 150 participants in total from 11 countries in Europe and Asia took part in 5-competition categories (including pupils, teachers, University students and nature lovers). The exhibition of winning works, judged by an International Jury, was organized with the support of UNESCO as a traveling one, exhibiting works in Bulgaria and abroad.

The third edition of this competition is planned for 2015, within an International Scientific-applied forum Protected Karst Territories and Life-long Education. The competition is in line with one of the initiatives (supported by UNESCO) to proclaim INTERNATIONAL YEAR OF KARST.

### INTERNATIONAL JURY

Professor Yoshihisa NAKANO – Chairman (Artist, Yamaguchi University, Japan)

RNDr. Petr ZAJICHEK (Geologist, Photographer, Cave Administration of the Czech Republic)

Pavla DVORSKÁ (Artist, Teacher, Czech Republic)

Associate professor Dilyana STEFANOVA (Geographer, NIGGG-BAS, Bulgaria)

Associate professor TodorKA KRUSSTEVA (Geographer, University of Shumen, Bulgaria)

Krsto TERZIEV (Artist, Sofia – Bulgaria)

Khristo KICHKOV (Geographer, Teacher, Gabrovo – Bulgaria)

### CRITERIA FOR EVALUATION OF WORKS

Originality of the idea realized with this work (creative achievement)

- Knowledge of Karst
- Artistic value
- Emotionality
- Technical skills (Technique)
- Professional autonomy in making

### SECOND INTERNATIONAL COMPETITION “KARST UNDER PROTECTION – GIFT FOR THE FUTURE GENERATIONS”

The competition is under the motto of the conference “Protected karst areas – Bridges to the Future” and runs in several categories.

**1. For pupils:**

- 1.1. Up to 12 years old:
  - Drawing or work with natural materials
- 1.2. Over 12 years old:
  - Poster / Card or multimedia presentation / video

**2. For teachers:**

- My unusual lesson

**3. For students:**

- Scientific essay or multimedia presentation
- Art installation
- For nature lovers, photographers:
  - Composition (3 to 5 photos)

### AWARDS

The second international competition “Karst under protection – a gift for future generations” it was honored by 106 participants from 10 countries: Armenia, Bulgaria, Croatia, Czech Republic, Estonia, Kazakhstan, Latvia, Lithuania, Russia, Japan.

14 awards winning works were identified in total (5 first, 4 second, 5 third prizes) and 13 ones winning encouragement. In addition, another 35 selected works will be included in the competition exhibition

For Grand Prix for creative achievement the jury nominated four competition works by 4 different categories. After processing the results, convincingly headed out the mural “Karst cave” (category “Work with natural materials”) developed by Amina Mushtakova (10) and Nariman Abdigapparov (11) from the UNESCO associated school “BEST” (Republics of Kazakhstan). They are the first winners of the Grand Prix of this contest and receive an invitation to be honored at the forum in Shumen, Bulgaria in September 2012.

### GRAND PRIZE for creative achievement

**Amina Mushtakova, Age 10**  
 UNESCO associated school “BEST”  
 Almaty, Republic of Kazakhstan

**Nariman Abdigapparov, Age 11**  
 UNESCO associated school “BEST”  
 Almaty, Republic of Kazakhstan

### Mural “Karst cave”

### STUDENTS up to 12 years old - Drawing

**First prize**  
 Drawing: “Cave painting”  
 Zhan Tagbergenov, Age 10;  
 UNESCO associated school “BEST”  
 Almaty, Republic of Kazakhstan

**Second prize**  
 Drawing: “Output things in the Cave”  
 Daiki Hayashi, Age 10; Hongo elementary school 897;  
 Iwagawa Shuho town Mine city, Yamaguchi prefecture, Japan

**Second prize**  
 Drawing: “Magical world of caves”  
 Zhan Tagbergenov, Age 10;  
 UNESCO associated school “BEST”  
 Almaty Republic of Kazakhstan

## International competition “Karst under protection – a gift for future generations”

### Acknowledgments

Part of the results we used were obtained in the framework of the International research project DO 02.260/18.12.2008 “Development of an experimental model of complex monitoring for sustainable development and management of protected karst territories”, supported by the Bulgarian National Science Fund. A part of the www.pproposed educational ideas have been discussed at the international scientific-practical conference “Protected karst territories – monitoring and management” (16-20 September 2012, Shumen, Bulgaria) and have been included as initiatives in the final resolution of the forum (<http://www.prokarsterra.bas.bg/forum2012/>). Their development has been supported by UNESCO through an approved project in the Program for participation 2012-2013 “proKARSTerra – integration between the research concept of Karst geosystems and educational concept “Life-long education” (on the example of model protected karst areas)”.

### WELCOME TO ProKARSTerra

www.prokarsterra.bas.bg

### WELCOME TO BULGARIA, 2015