Nadja Zupan Hajna

REPORT ABOUT THE KARST RESEARCH INSTITUTE ZRC SAZU CO-OPERATION WITH PR OF CHINA IN 1995

The co-operation of the Karst Research Institute ZRC SAZU with PR of China is organized by the Ministry of Science and Technology at two projects; one involves the Institute of Geology of the Chinese Academy of Science, Beijing and the other Institute of Geography, Kunming, Yunnan. The projects were accepted by the agreement of scientific technologic co-operation between the governments of Slovenia and China in February 1995 in Beijing. The cooperation will last three years with the possibility of prolongation of both projects. Project No. 01-3-03, SLO-3 with Institute of Geology of the Chinese Academy of Sciences, Beijing is entitled Karst Environment Protection and Exploitation of Cave Resources. The main topics are exploration and development of large cave systems and the protection of cave environment, safeguarding and restoration of deserted karst areas. The project No. 01-3-05, SLO-5 with Yunnan Institute of Geography, Kunmming is entitled A Co-operative Research on Karst Phenomena Preservation, Protection and Large Cave Systems Exploration in Yunnan Province. The topics within this project are protection of karst phenomena associated with karst tourism development and exploration and exploitation of large cave systems.

The co-operation at both projects started in 1995 by visit of Chinese researchers to Slovenia at the end of September and at the beginning of October 1995. Our visit to China took part in November 1995.

Within the project Karst Environment Protection and Exploitation of Cave Resources three researchers of the Institute of Geology of the Chinese Academy of Sciences visited our Institute at Postojna from September 22 to October 5, 1995. The member of the delegation were Prof. Zhang Shouyue, geologist, Mrs. Jin Yuzhang, chemist and Mr. Shi Mengxiong, hydrogeologist. During their visit they were mostly interested in karstology and speleogenesis in Slovenia, protection against soil erosion and karst reforestation. They were also interested in research and exploitation of large cave systems and protection of cave environment. They visited the classical Karst, cave Vilenica and got acquainted with problems resulting in motorway construction over karst. During their visit to Ljubljana they were received at the Ministry of Science and Technology, by the director of the ZRC SAZU and at Economic and Commercial Office of PR of China.

Within the project A Co-operative Research on Karst Phenomena Preservation, Protection and Large Cave Systems Exploration in Yunnan Province five researchers of Yunnan Institute of Gerography, Kunming visited our Institute at Postojna from October 4 to October 19, 1995. The members of the delegation were Dr. Guo Laixi, Director of the Institute, touristic

geographer, Dr. Zhang Fan, biologist, assistant of speleology, Dr. Liu Hong, hydrogeologiost, assist. prof. of speleology and geomorphology, Dr. Chen Xiaoping, geographer, assist. prof. of speleology and eng. Huang Wenkun, a representative of Science Foundation of Yunnan Province. During their visit they showed the interest in protection of karst phenomena associated with karst tourism development and exploitation of large cave systems, and new research methods related to karst hydrology and speleogenesis. They visited Classical Karst, got acquainted with problems of motorway construction over karst, visited blind valley in Matarsko Podolje, karst poljes, alpine and high-mountainous karst of Trnovski Gozd and karst springs at the foot of Trnovski Gozd and Banjška Planota. They were received at the Ministry of Science and Technology, by the director of Znanstvenoraziskovalni center SAZU, by Economic and Commercial Office of PR of China and by Biological Centre of Biotechnical Faculty, Department of Biology.

Related to the programs between both institutes two our researchers visited Chinese karst from November 2 to December 5, 1995 in order to gather suitable locations for further joint researches.

Together with Yunnan's Institute of Geography, Kunming we visited three karst areas where a cooperative research may be undertaken. Yunnan province lies in the southwest of China and covers 390.000 square kilometres. It is situated near the border of Vietnam, Laos, Burma and Chinese provinces Tibet, Sichuan, Guizhou and Guangxi. The above sea level altitudes vary from 100 to 5000 m. The hydrogeological system drains the Yellow, Pearl and Red rivers. One third of the surface belongs to carbonate rocks, mostly of the Upper Paleozoic and Triassic age. In the western part of the province the carbonate rocks outcrop at the surface most of them are at the border with Guizhou province. In Yunnan the following types of karst are distinguished: the karst of tropical rainforest in the south (at the border with Burma); the karst of tectonic basins (basin around Kunming, Mengzi basin); stone forests on plateaus (in Lunan) and cone karst in the southeast (Xichou). During our visit of the Yunnan Institute of geography in Kunming we visited karst surface of Western Hill, west from Kunming, show cave Jiu Xiang, Stone Forest, Nai Gu Stone Forest and the area where the underground water reservoir is planned. Shilin or Stone Forest is one of the most famous karst areas in the world. It lies about 1750 to 1950 m a.s.l. It is divided into seven tourist parts with stone forests, caves, lakes and waterfalls. There is an impressive tufa waterfall Da Die Shui, 90 m high at 1540 m a.s.l. in the valley oriented east-west.

The area of Great and Small Stone Forest National park is covered by thick red soil, where the soil is missing variously tall karren are exposed, the highest among them are 20 to 30 m high. Lower features are termed stone teeth and higher stone forest. They developed below the soil cover. Stone forests in this area developed in Permian limestones and dolomites. There is

no connection between lithology and rock structure and development of large karren. They developed in limestones and dolomites, with cherts or without them or with inliers of dolomite. They may develop in carbonate rocks with sequences of many different genetic types. The inclination of layers is small, 5° or even less and this is important for their stability; karren are very stable against collapse and they may even reach the height of 30 m. The area makes an application for being inscribed into World Natural Heritage List at UNESCO. Near the Mengzi town we visited blind valley called Wulichong where a water reservoir is being built in a karst terrain. At the border between Vietnam and Yunnan, near Xichou, we visited a region of cone karst. Among 200 m high cones variously large karst depressions are lying, cockpits and karst poljes; the soil is preserved in the bottom of depressions only.

The second part of our visit to China was organized by the geologists from the Institute of Geology of Chinese Academy of Science, Beijing to the Guizhou province. Guizhou covers 170.000 square kilometers in the south of China and lies from 1000 to 3000 m a.s.l. Hydrogeologically it belongs to drainage systems of the Pearl and Yellow rivers. The main difference in regard to Yunnan lies in important quantities of coal deposited in the Lower and Upper Permian. Main coal layers were deposited in the Lower and Upper Permian while in the north of China main coal layers belong to the Upper Carboniferous. 75% of surface belong to carbonate rocks. The most important for karst development are Permian limestones, from 400 to 1000 m thick, locally interrupted by diabase dikes. The second the most common limestones where karst developed are middle Triassic. The limestones are massive and more than 300 m thick. The prevailing morphological feature is cone karst, single cones or hums diplaying various forms. The most impressive is their areal distribution. Among them are cockpits, ouvalas and karst poljes of different dimensions. Local relief differences are smaller than 400 m, but in some gorges they may even exceed 1000 m. Several types of karst are distinguished in Guizhou according to their topography, lithology and tectonics: the karst of the western, northern, central, southern, southwestern and eastern Guizhou. Near the town Pang Xian we visited several smaller karst poljes, sinking streams and caves and near Liu Pan Shui high karst plateau where the river Bai Pan Jiang cut its canyon and natural arch Tian Sheng Qiao. On our way back we visited the geological institute for karst in Guilin.