

JERKO NUIĆ
BOŽIDAR KANAJET
DRAGAN KRASIĆ
IVO GALIĆ

*Faculty of Mining, Geology and Petroleum Engineering
University of Zagreb, Pierottijeva 6, 10000 Zagreb, Croatia*

LAND RECLAMATION OF THE EXCAVATED AREAS IN SURFACE EXPLOITATION OF NONMETALS

Summary *The outcome of mining exploitation of nonmetals is, as a rule, a destruction-devastation. Direct destruction grows into a shaped creation of new forms and contents adaptable to the environment. In the process of mining creativity, the excavated areas are currently shaped and in a final stage they are brought to a redestination. The quarries of technical-building stone - "Skalice", the island of Pašman, and that of plaster stone - "Kojića greda", Sinj, are the examples of how it was operationally tried to achieve this goal of redestination by building the sporting-recreation objects and planting vineyards plantations.*

Introduction

When making plans for putting again into function plateaus and etages on the slopes of the mine pit, or the objects which had only mining destination, the old mining plans and aerophotoses may not serve only for working out charts or the closing plans but for some other purposes as well. The very photograms may give to a planner a valid and true insight into surface characteristics, such as are phenomenon of erosion, ground slides, influence of moisture on vegetation and spoil bank as unstable parts. For the protection of environment, deserted object, administration buildings, store-houses, garages, communal installations should be urbanised or adapted into recreation centres, farm-buildings or similar.

A deserted surface pit of building material may usefully serve, for instance, for a hunters' club as a training spot, and if it is on the water layer, for a

fish pond, i.e. fishery. A definite desertion of a mining object, and not his meaningful utilisation, may only make damage to the environment. Therefore, when making plans for the revival of plateaus and etages, we may use terrestrial photoses in digital form to be able to obtain plans of various measures necessary for geological and hydrogeological projects and similar scopes by means of computer modelling of grounds in 3D.

By means of mining surface exploitation of mineral raw materials, extent works in nature are, as a rule, performed. With nonmetals, it is usually a question of less valuable mineral raw material on the market which does not tolerate expensive transport, therefore the location of activations are frequent which is reflected in numerous "scars" on the environment. Recultivation of excavated areas thus becomes a support point for present mining works and a base for future ones.

With regard to various natural forms of the environment a specific appearance of useful minerals substance and its distribution in the space of treated site, and all the possibilities of the region, new forms and contents adaptable to the environment and productive for the life of present and future generations should be created and worked out. On the natural models of the quarry of technical-building stone "Skalice", Pašman, and the plaster stone quarry "Kojića greda", Sinj, some of these possibilities are preliminarily outlined, opening thus a discussion on this theme and stimulating creativity of mining engineers and scientist.

Legal provisions

Legal regulations of the Republic of Croatia, regarding the environment protection are coordinated with the international prescriptions and criteria, and they are based on particular definitions of the Constitution and Declaration on the environment protection of the Republic of Croatia.

Investigations and exploitation of the mineral raw materials in the Republic of Croatia are carried out under conditions and manner prescribed by the following laws: The Law on mining, Law on the protection of environment, Law on the protection of nature and Law on regional planning.

By the mentioned laws, the valorization of the mining wealth is dictated in the sense of its rational and purposeful usage and in the frame of preserving nature and protecting environment and regional planning of surrounding grounds.

Models of observation (examples from practice)

The quarry of technical-building stone "Skalice" is situated on the island of Pašman in Dalmatia. The exploitation field, large 7 ha, takes a part of the upland plateau which on two sides directly falls down into the sea. The quarry was formerly opened for local requirements, and only now an organised production, direct by a private investor, has been initiated. Production possibilities as well as the needs for raw materials are small, so the quarry is interesting more as a model for observation. The concept of exploitation is a classical one, and it is worth to point out a finale state of the pit (Fig. 1) which displays a configuration of sporting-recreation centre.

A plaster stone quarry "Kojića greda", Sinj, is situated in Dalmatian mountain range (Zagora). In a continuous exploitation of plaster stone in the region of Sinj, it is planned to open a new deposit on the "Kojića greda" quarry. The deposit is partly bared and partly under alluvial deposits. In final stage, covering deposit is being spread in excavated spaces and biologically recultivated by planting vineyards as it is shown in Fig. 2.

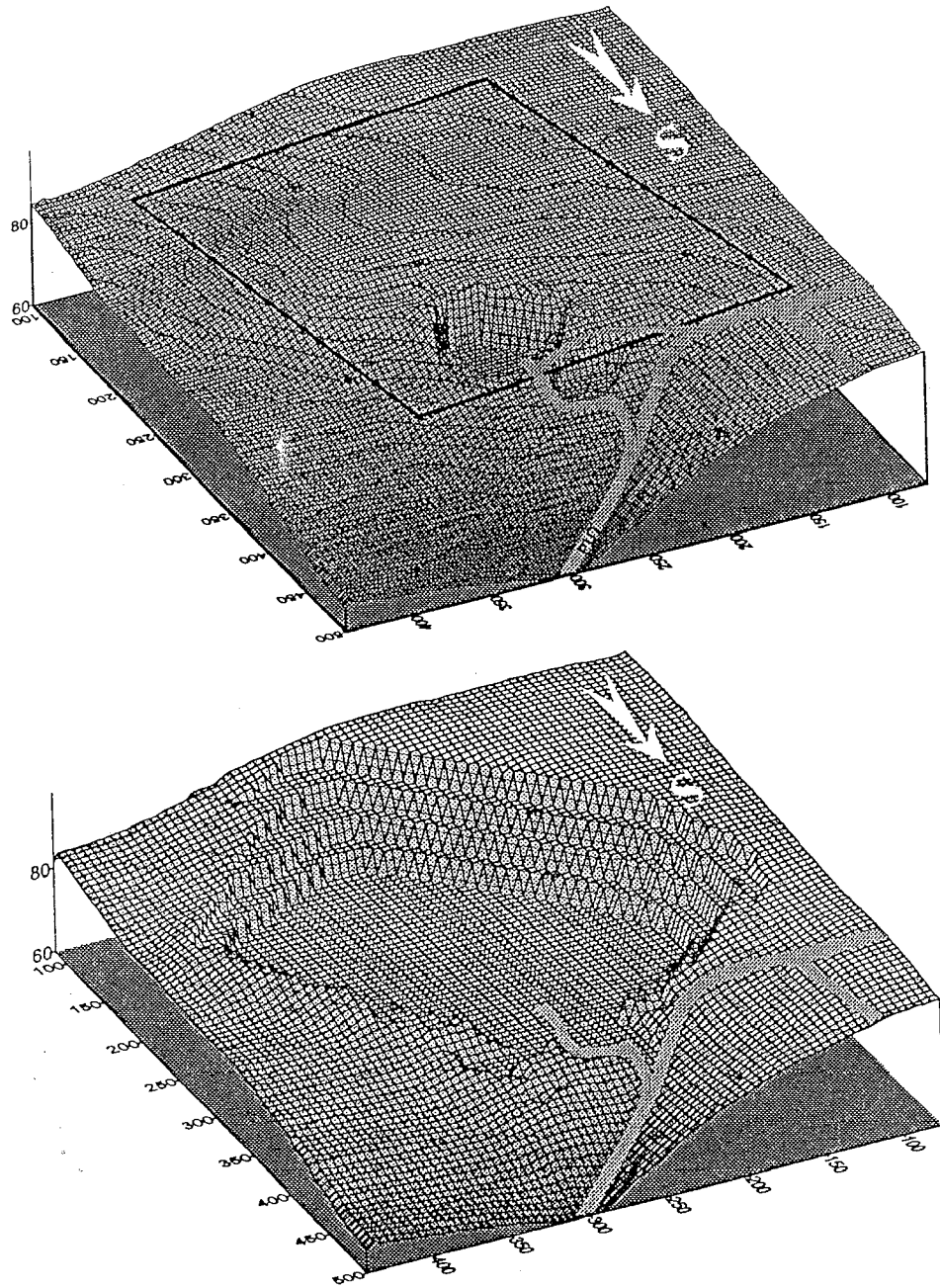


Figure 1: Quarry "Skalice" - Pašman (initial and final state)

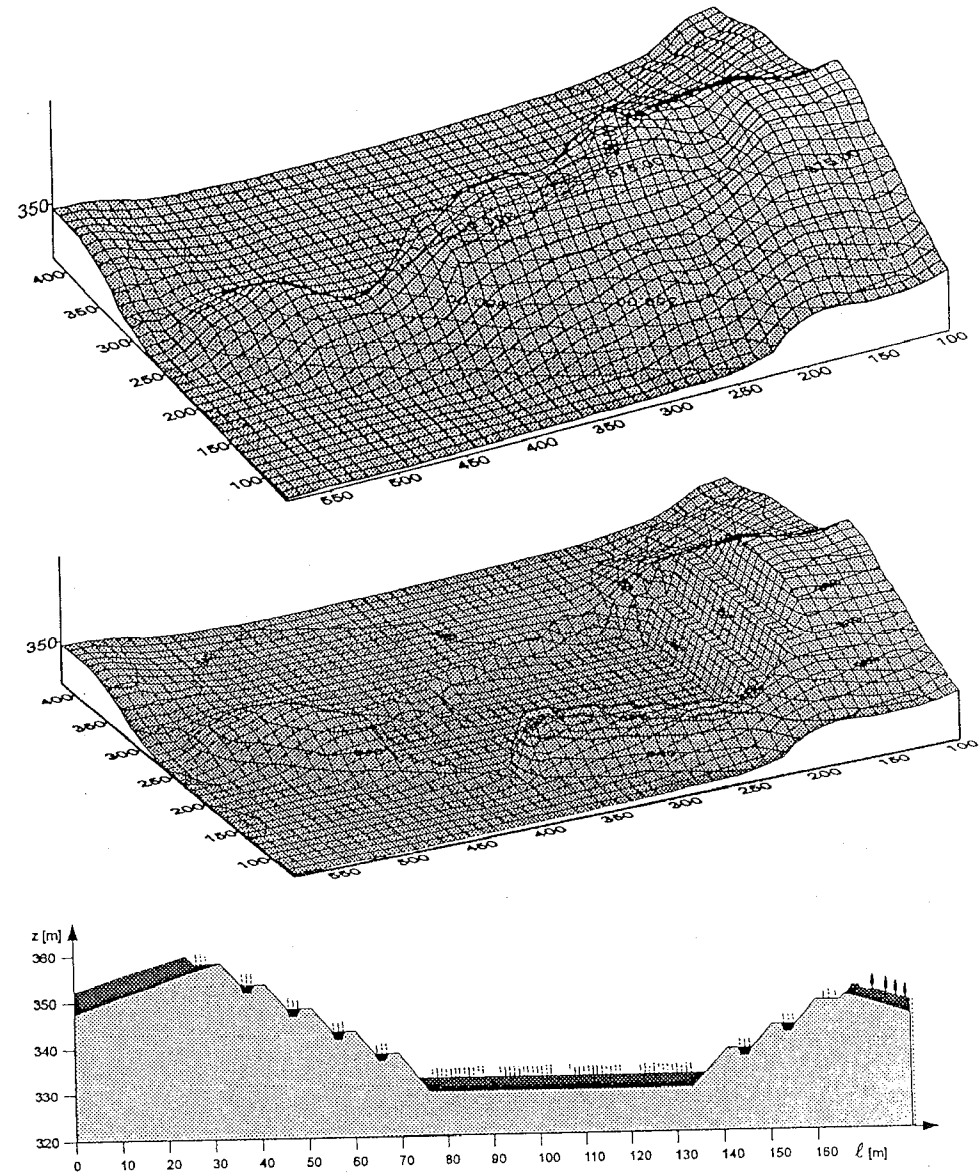


Figure 2: Plaster stone quarry "Kojića greda", Sinj (present and final state)

Conclusion

The example of the quarry of technical-building stone "Skalice" on the island of Pašman exceptionally shows great possibilities as well as creative ability of mining engineers where out of one ordinary upland plane, during exploitation of technical-building stone, a challenging sporting-recreation content, suitable for future necessities and possibilities of immediate and wider surrounding area, may be realised.

In the case of plaster stone quarry "Kojića greda", Sinj, an irregular natural geologic form - beam, by exploitation of plaster stone is transformed in a productive horizontal plateau with side etages, where refuse alluvial deposit is being shifted in the form of inner spoil bank of overlays, as a basis for biological recultivation, i.e. planting of vineyard plantation.

Literature

1. Nuić, J., Krasić, D., Živković, S. (1996.): *Ecological aspects of mining production of nonmetals*. Scientific-expert symposium "Protection of nature and environment and exploitation of mineral raw materials". Varaždin, Croatia, 169/180.
2. Nuić, J., Krasić, D., Galić, I. (1997.): *Shaping and redestination of excavated areas in the course of the exploitation of technical building stone*. RGN zbornik, Zagreb, Croatia, Vol. 9.

Recenzował: Dr inż. Stanisław Gruszczyński