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IS IT POSSIBLE TO USE NATURAL RESOURCES IN A SUSTAINABLE MANNER AFTER INTENSIVE EXPLOITATION?

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Abstract: Due to the long isolation period and the development of various industry sectors, the contamination of land and additional negative environmental impacts have been continuous and severe in the period 1950-1990 for Albania. Based on data published in literature, this review is a first attempt to put together the natural resources and the sites where the ore minerals have been treated in Albania in order to address issues related to the sustainable development. However, the intervention of the government to minimize the adversity left behind from the former industry in the form of resource conservation subsidies or depletion taxes for new investors, might improve the present environmental situation. The use of cost benefit analysis to evaluate the development in conjunction with sustainable use of natural resources might minimize the adversary effects of the past. Since other factors, such as the financial constrains, play an important role in the equation, the aid of the foreign investors or international institutions shall also be supported and assisted by the Albanian authorities.

Keywords: sustainable development; natural resources; economy; industry; waste; environment.

1. Introduction

Sustainable development implies meeting the needs of today's population in terms of production without compromising the ability of future generations to meet theirs (WCED, 1987). The most recent United Nations reports refer to the "interdependent and mutually reinforcing pillars" of sustainable development as economic development, social development and environmental protection. The fulfillment of these conditions depends on the one hand on the ability of the NGO's to influence the right decisions, on the determination mainly of the government to provide the legal framework and the necessary financial investments, and on the other hand, the determination of the society to develop the economy and prosperity, respecting the natural resources and the environment.

When the concept of the sustainable developed was introduced, Albania as well as the rest of the East European countries were partly or fully isolated starting from the 40's until early 1990's. During this period, the development of various heavy industry sectors was primordial for the internal economical situation., as, The economic policy of the Albanian communist government, as was the case in other East-European countries, was motivated by the efforts for ever-increasing levels of production and output, but has left behind a situation of economic and industrial inefficiency, recession, severe environmental degradation, pollution. Now the country is facing the challenges of the development and wishes to become a member of the European institutions and Europe as such, but at the same time is facing difficult economic conditions fragile democracy and social norms as well as the legacy of pollutants from the earlier system.

This review will provide an inventory of the sites where the natural resources have been exploited and treated during the isolation period and address the negative implications for the environment on the long term. Moreover some solutions based on the experience of the developed countries are recommended.

2. Albanian natural resources

Albanian mining industry has an extensive, profitable and varied history due to the complex and diverse geological formations in the country. The main geological zones of Albania are indicated in Fig.1 A. The gas, oil and bitumen resources are mainly located in the external Albanides (Ionian zone). Due to the presence of the ophiolite complex the ore reserves are very extensive (i.e. chromium, copper, iron and nickel) especially in the north eastern part of the country Fig. 2 B, C. A

large number of small and some large sized (heavy metal) ore deposits have been mined over the last decades especially in Mirdita Zone. As was the case elsewhere in the world, mining and ore processing often had a disastrous impact on the environment. In Albania, the impact of industrial development was aggravated due to the lack of advanced technology as a consequence of the isolated political situation until 1990. Contaminated sites in Albania are often characterized by a desert-like landscape, the absence of "real" infrastructure and the use of such places to dump additional solid wastes (i.e. construction debris) or other waste materials due to the absence of landfill installations. The map of the main natural resources and their exploitation sites are shown in Fig. 1 C.

The development of the various industrial sectors that were exploiting the ore reserves was very intense especially during the communist period and this was mainly because of the extreme isolation. The installation of very old technology, mainly from China and Russia has deteriorated the situation rapidly due to the absence of waste treatment and large waste discharge. The wastes were generally deposited outside the treatment site and no measures were taken to minimize the heavy metal contamination of soils, sediments, surface and groundwater.

3. Albanian ore industry

Chromium industry in Albania includes extraction, enrichment and smelting of chromium ores in Ferro-chromium smelter plants. Presently 8 chromium ore mines operate partially, compared with 10 mines operating until 1995. From five existing enrichment factories, only two (in Bulqiza and Kalimash) are still partly active. Also, two ferrochromium smelters (i.e. Burrel and Elbasan), have been working under their maximum capacity starting from 1998.

The most serious pollution to the environment is caused by the chromium ore smelters, which discharge considerable amounts of pollutants in the form of solid waste slags (50 % chromium) and dust particles into the air. Qiriazi and Sala (2000) estimated that about 9 million m³ of industrial solid waste (i.e. slags) were produced by the Albanian chromium industry in the period 1945-2000. The smelters in Burrel and in Elbasan had each three furnaces and were functional for 24/24 h and7/7 a week, where 55000 m³ of gases were estimated to be released hourly by each smelter (ISPTK, 1995). From a study conducted by ISPTK (1995) it was estimated that the content of Cr-bearing dust particles in the emissions in Burrel, accounted for about 1.8% of the total gases emitted. Both smelters operate with open gas systems, which leads to the direct discharge of dust particles into the environment, without any previous treatment. The release of the dust particles into the surrounding environment from the ferrochromium smelter in Burrel and from the Elbasan metallurgical complex has been reported by Shtiza et al (2005) and by Tashko et al (2005) and Shtiza et al (2009) respectively. Due to the lack of dust catching supplies, it is calculated that approximately 300 tones of dust per year, are emitted into the atmosphere. The amount of industrial discharges by this sector during 1998, compared with 1997, has been about 96.6% although the production rate has been lower (UNEP, 2001).

The copper was mainly found in the Krasta-Cukalli zone and was mainly used for export. Beside the high levels of Cu into the soils and sediments around exploitation areas, there are no data on the contamination on a larger scale.

The intensive exploitation of iron-nickel laterites was mainly concentrated in the southern eastern part of Albania, while their further treatment and melting was carried out in the Elbasani metallurgical complex. The wastes resulting from the smelting process were deposited in an open field without any actions taken to control the heavy metal release and groundwater infiltration.

Coal was mainly exploited in the vicinity of Tirana and from the southern eastern Albania as shown in fig. 1.C. Use of coal was mainly for industry and a small part also for house heating. Nowadays the exploitation of coal has fully ceased and there is no information on the further development of coal exploitation and industrial uses.

As a consequence of the negative effects of mining and mineral processing on the environment, soils and sediments in the neighborhood of the mines and industrial sites, but also along the traffic roads are often extremely polluted. Majority of the former intensively used (or exploited) sites are not operational any more; however the environmental threat still exists due to negligence, unawareness and financial constraints. These sites are now characterized by lack of vegetation and there is a high risk of spreading of the pollutants by dust and by possible toxic effluents to the river, groundwater

and sea. The major problem is that the contamination is spreading out. Metal-bearing particles from contaminated areas can be transported by water, into the river systems causing downstream spreading of the contaminants in riverbed and alluvial plain sediments. Moreover the easy access of people living in the vicinity to these sites makes them hazardous spots with respect to the long term exposure for the population. Awareness about these problems is increasing but concrete actions are still scarce.

In Albania, the exploitation and treatment of ores (especially during the isolation period 1945-1990), left behind an enormous legacy of contaminants spread all around the country. The duty of present and future generations is to identify these sites, quantify the pollutants and predict the short and long term measures to be undertaken in order to minimize exposure and fulfill to some extent the conditions for a sustainable development.

4. Challenges for the legacy of pollutants and future

As is clear from the data shown, the economic development has eroded and/or damaged the natural capital, and on the long term the development is not successful. The European principle (EU Directive 2004/35/CE) that the polluter pays can't be applied in the specific case of Albania, since the state has not the economical potential to afford the costs of the past. More important that the polluter pay for externalities is that property rights over the environment are defined and enforced. Environment does not belong to one generation, thus sensibilization and action must be undertaken as soon as possible in order to minimize the damage for the future.

4.1. Problems & Solutions

One obstacle in the application of environmental policy is the problem of the property rights. During the communist period, everything 'belonged' to the state, while property is one of the main pillars that drives the free market economy and improves the development. When the contamination occurred, the soil/land or the object 'belonged' to the state, but now this might be property of someone. Since the state can't afford to pay for the site remediation, this becomes an obligation for the private investor. So the development of a new industrial activity shall consider major costs for a clean-up plan. Since the starting costs become considerable, the private initiative is limited from an early stage of the investment phase.

In developed countries the environmental regulations make companies more innovative and fit for the future, thus environmental protection is also a positive investment for the economy (BMU & UBA, 2009; Germany Ministry of Environment, 2009). It reduces follow-up costs resulting from environmental damage that society would otherwise have to bear. The technological limitations in Albania at the time of industrialization (i.e. release of unfiltered emissions, dumping of waste) resulted in spreading of the contaminants on relatively large scale and the exposure of humans and biota especially near the former industrial sites (Tashko et al , 2005; Shtiza et al, 2005; 2008; 2009; Mazreku et al 2010). The chromium slags can be considered also as a potential economic resource, since they contain up to 50 % chromium ore which can be reprocessed. Using efficient, innovative and cost-effective techniques that could recover maximal quantities of commercial minerals from ore, or reprocessing waste can be considered along the lines of the sustainable development (Christos Katagas, personal communication). Thus, more flexible approaches would give new market incentives to clean up these old abandoned sites more efficiently and become beneficial to the small communities and the environment. Thus the new investments shall be agreed upon the implementation of environmental friendly technology and the control of the waste deposition sites.

Pezzey (1992) indicated that resource-using investments are more common than the resource saving investments and this is due to the fact that by using environmental policy, the resource prices will go up, the investments will be shifted towards resource saving and thus reducing the total investment demand. Therefore the goal of the policy developers shall be to support and prioritize the sustainable projects, building cost-benefit analysis in the early stages of the projects.

The policy makers emphasize the investments in the economical development, while for the regeneration of the environment and protection there is no strategy due the economical restrictions. The effects of the delay in investing for the protection of the environment are difficult to predict, however one thing is clear; a big investment today may have a large impact in the future. By investing 0.6 billion € in the period 1990-1992, the Federal German government not only improved the environmental conditions by minimizing the waste release,

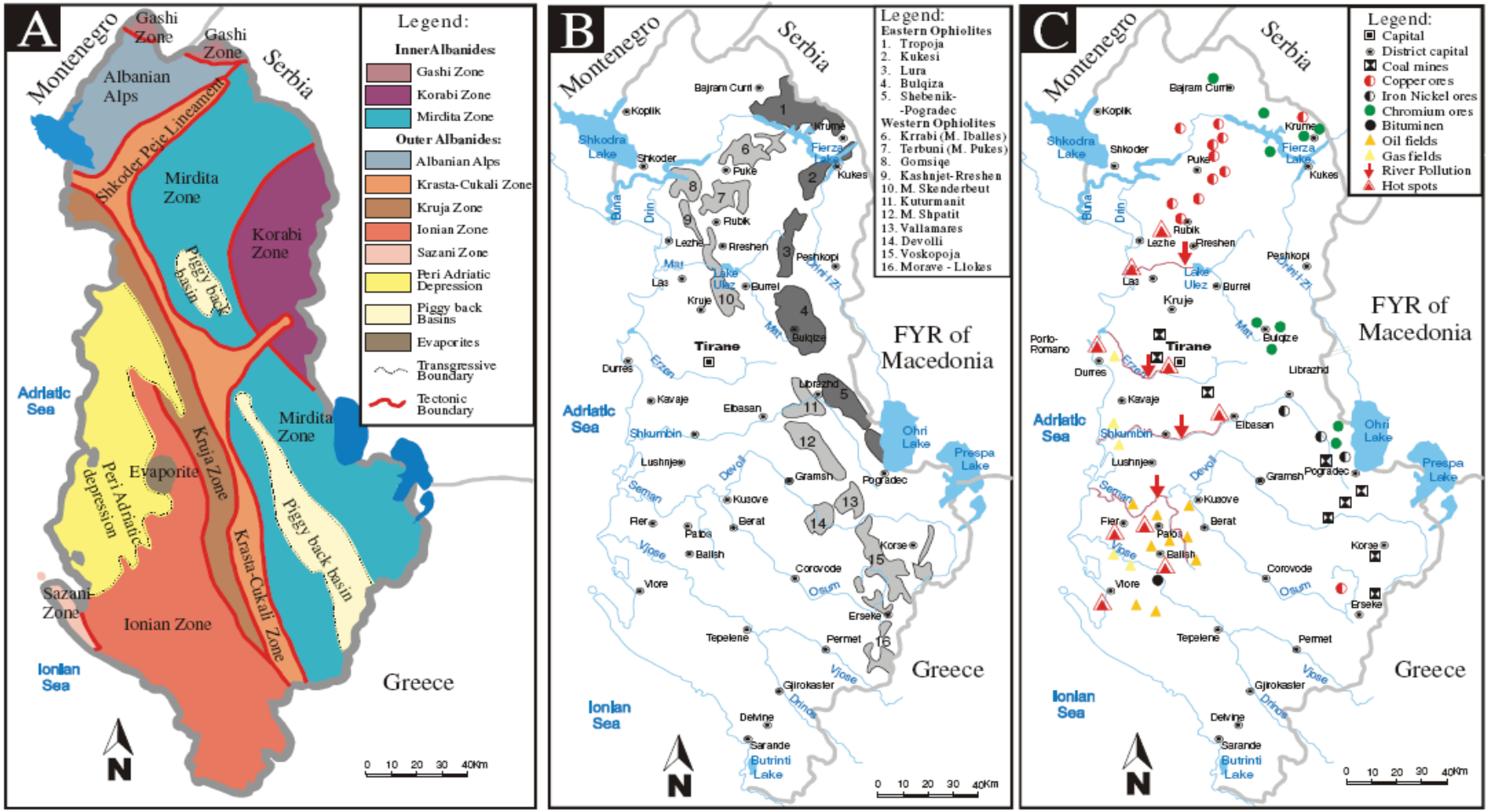

Fig. 1 A. The main geological units of Albanides (ISPGJ and IGJN, 1983; Vranai et al., 1997); B. Eastern and Western Ophiolite Belt (respectively EOB and WOB) with indication of the main chromite ore massifs occurring within the Mirdita Zone (Vranai et al., 1997); C. Map of the main mineralogical resources in Albania (Meço et al., 2000).

but also created employment possibilities for more then 120 000 people (Hallstrom, 1999). Maybe a similar approach can also be applied in Albania.

The experience from developed countries has shown that environmental improvement is generally compatible with economical growth in the mature stages of the development. But, as is the case of Albania the environmental policy is presently weak, being in the early stage of the industrialization and economic development. Therefore alternatives, such as tax benefits in regenerating brownfields and/or polluted areas might be considered as a possible alternative to regenerate and develop.

Costs of reversing environmental damages in Albania, and the implementation of sustainable development policies and technologies, are so enormous that Albania alone will be unable to meet them. Thus the help of the EU, USA and/or international organizations such as International Monetary Fund (IMF), World Bank (WB), … in the form of significant and long term economic and technological aid will be mostly to initiate awareness and action trend on a population level. The lack of this aid may lead to further decline in the environmental quality in the present Central European Countries and the EU. This ability to impact the EU's environment could be the major factor in a decision by the EU to implement environmental taxes against these states, as pointed out by Hallstrom, (1999).

The sustainability in the context of nonrenewable and renewable resources can be considered in combination with the cost benefit analysis (CBA) in order to minimize the future damage of the environment (Shtiza and Swennen, 2005). While in EU and USA, the amount of CBA that take into account the environmental impacts being undertaken has increased, its influence on policy making is still open to question. Nonetheless, CBA has begun to have influence in the setting of environmental taxes and alternative decision rules appear to suffer as many, if not more, shortcomings as those faced by CBA (Hanley, 1992; Pearce , 1998). It is often forgotten that mining is but a temporary use of land, whose immediate impact can be masked and minimized by the deployment of the appropriate technology, and which can create great wealth for the community of the stakeholders. The mining industry needs to maintain scrupulously high standards, both for the health and safety of its workforce, the wider community and for the local environment. It is suffering today, partly because it has not met proper standards in the past (Crowson, 1996). Improving the management strategies implies to have a long term vision for the future while making decisions now.

5. Conclusions

This is an early attempt to make a map of resources and industrial treatment of minerals (polluted sites) in Albania with data available from the published literature. The need to increase the advocacy for the Albanian environmental problems in not only caused by the present economical situation, but mainly from the past policy of heavy industrialization. Recognition of the issues is a first step in the development and implementation of management strategies. The development strategies and programs that do not take adequate account of the state of critical resources, forests, soils, grassland, freshwater, coastal areas and fisheries may degrade the resources on which the future growth is dependent. This publication shows the close link between economical development and the new role of environmental policies. Environmental protection generally pays-off on the long term, as confirmed by the experience of the industrialized countries. Thus the use of the previous experiences can be of great benefit in the efficient use of renewable and nonrenewable resources for the development of a sustainable environment.

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