

Artículo de investigación

The sustainability of unused industrial areas: an example, historical development of the Cyprus copper deposit

La sostenibilidad de áreas industriales no utilizadas: un ejemplo, el desarrollo histórico del depósito de cobre de Chipre

A sustentabilidade das áreas industriais não usadas: um exemplo, o desenvolvimento histórico do depósito de cobre de Chipre

Recibido: 20 de abril de 2018. Aceptado: 10 de mayo de 2018

Written by:
V. Akansu, A. Gertik³⁴

Abstract

The constitution of industrial facilities in rural settlements and the pollution that the deposits produced affect the liveability of that area negatively. The Cyprus Mine Corporation, which was an American company between the years of 1912-1974. The protection of the open-deposits of the abandoned factory facilities is nowadays affecting the ecological parameters in a way that they are at risk. The main focus has been on the transformation of the pollution which occur in the Lefke settlements into a green-system and on the recovery of the lost ecological-values. Accordingly, the basic principles of wheeler on the behalf of sustainability have been revealed aimed at the ensurance of the liveability of the unused-industrial building environments and chemical-waste areas. Thus a planning approach has been suggested for the protection of ecological parameters of problematic areas and its recovery according to obtained results. Within this approach the sample being unused-industrial area in the Lefke-settlement has been examined. In the planning of the cities a suggestion for a road map to follow for the planning studies of idle industrial areas was revealed as a result of the used method.

Keywords: Sustainability, Rural Settlement, Ecology, Industrial Pollution, Copper Mine, Wheeler Principles

Resumen

La constitución de instalaciones industriales en asentamientos rurales y la contaminación que los depósitos producen afectan negativamente la habitabilidad de esa área. La corporación Cyprus Mine, que fue una empresa estadounidense entre los años de 1912-1974. La protección de los depósitos abiertos de las instalaciones de fábrica abandonadas está afectando los parámetros ecológicos de una manera que están en riesgo. El foco principal ha estado en la transformación de la contaminación que ocurre en los asentamientos de Lefke en un sistema ecológico y en la recuperación de los valores ecológicos perdidos. En consecuencia, se han revelado los principios básicos de Wheeler en nombre de la sostenibilidad con el objetivo de garantizar la habitabilidad de los entornos de edificios industriales no utilizados y las áreas de desechos químicos. Por lo tanto, se ha sugerido un enfoque de planificación para la protección de los parámetros ecológicos de las áreas problemáticas y su recuperación de acuerdo con los resultados obtenidos. Dentro de este enfoque, se ha examinado la muestra del área industrial no utilizada en el asentamiento de Lefke. En la planificación de las ciudades, se reveló una sugerencia de una hoja de ruta para los estudios de planificación de áreas industriales inactivas como resultado del método utilizado.

Palabras clave: Sostenibilidad, asentamiento rural, ecología, contaminación industrial, mina de cobre, principios de Wheeler

³⁴ Near East University, Faculty of Architecture, Nicosia-Cyprus.

Resumo

A constituição de instalações industriais em assentamentos rurais e a poluição que os depósitos produzem afetam negativamente a habitabilidade daquela área. A Cyprus Mine Corporation, que era uma empresa dos EUA entre os anos de 1912-1974. A proteção de depósitos abertos de fábricas abandonadas está afetando os parâmetros ecológicos de uma forma que está em risco. O foco principal tem sido a transformação da poluição que ocorre nos assentamentos de Lefke em um sistema ecológico e na recuperação de valores ecológicos perdidos. Como resultado, os princípios básicos da Wheeler em nome da sustentabilidade foram revelados para garantir a habitabilidade de edifícios industriais não utilizados e áreas de resíduos químicos. Portanto, uma abordagem de planejamento tem sido sugerida para a proteção dos parâmetros ecológicos das áreas problemáticas e sua recuperação de acordo com os resultados obtidos. Nesta abordagem, a amostra da área industrial não utilizada no assentamento de Lefke foi examinada. No planejamento das cidades, uma sugestão de um roteiro para o planejamento de estudos de áreas industriais ociosas foi revelada como resultado do método utilizado.

Palavras-chave: Sustentabilidade, assentamento rural, ecologia, poluição industrial, mina de cobre, princípios Wheeler

Introduction

The island of Cyprus, known for having its name from the copper mine, has caught the attention of many countries with its strategic location, natural resources, natural and historical beauties and has hosted many civilizations. Among these civilizations, Egyptians, Phoenicians, Assyrians, Persians, Helens, Romans, Byzantines, Arabs, Franks, Genoese, Lusignans, Venetians, Ottoman, and British are those who influenced the Island most with regard to religion, trade, commerce, culture, way of life and politics (Hill, 1972; Gazioglu, 1990).

The natural resources (copper, gold, silver, sulphur) in the island are common in the Lefke settlement which is situated within the valley, parallel to the sea and bound to the area of Güzeyurt (placed northwest in the capital Lefkosa). The mine deposit (Xeros) is located in the northern foothill and coastal plain of the Trodos Mountain in northern Cyprus, approximately 40 km west of Lefkosa. Elevations range from sea level to approximately 300 meters MSL (mean sea level) in the vicinity of the former Mavrovouni mine (Cohen, 2002). (Fig. 1) Starting from the Bronze Age (~1350 BC), the fact that rich copper deposits have been found has increased the value of Lefke (Christofides, 2009). Plutarch wrote of the ancient city of Soli, also located near Lefke, where mining and smelting were likely already well-development in 575 BC (Lavander, 1962). The most prominent evidence of ancient workings are the heaps of black slag located on the surface major mineral

deposits, including piles Mavrovouni (near Lefke) and Skouriotissa (Cohen, 2002).

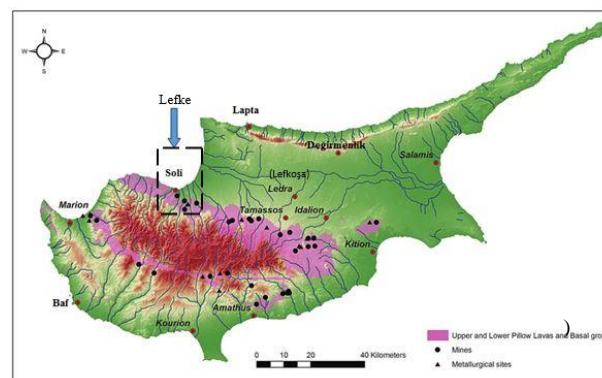


Fig. (1). Map of Cyprus Showing the Copper-Rich Pillow Lava, the Location of Mines and Metallurgical Sites Dating to the Iron Age (produced by A. Agapiou based on digital geological data provided by the Cyprus Geological Survey from Kassianidou, 2013)

The copper mine being explored and used within the historical process has experienced developments especially within a period which came after the island was rented to the British by the Ottomans in 1878.

The British have presented new legal practices which enabled developments in transportation and communication, education and health, agricultural policies and administration in the island Tozan, 2008). But in addition to these developments, in cities and rural settlements

especially for Lefke it has been the beginning of the biggest environmental holocaust.

The American company which took advantage of the island being under the British rule started its work on the copper mine in Lefke after receiving permission of the British rule. The mining activity has been turned into an important advantage between the years of 1912-1974. Lefke, which experienced a great industrial progress with the Cyprus Mine Corporation (CMC) is the first and only sample of a small-scale industrial developed area in Cyprus.

This article will present the change and development of the CMC Company which was established between the years of 1912 and 1974 in Lefke and the issues that came in tow. Besides that, the base was on transforming the problematic area into healthy and peaceful liveable areas by correcting the damages from the past. Basically there is a threat for the ensurance of the ecological sustainability around the industrial waste in Lefke. In this direction, the necessity of suggestions for the ensurance of the protection of the ecological values, along with the livability of the CMC area and its environment will be the focus.

In this context, Wheeler was looking for a way to ensure comfort in the cities as green, safe, in human scale and attractive for women, children, elders and other groups of all individuals of the community (Wheeler, 2003). The fact that a sustainable city is impossible, but the ways to follow for becoming a sustainable city are summarized as 9 principles: 1. compact, balanced landuse, 2. vehicle use and easy access, 3. wise use of the sources, reduction of wastes, trevention of environmental pollution, 4. the restoration of natural systems, 5. good housing and living environment, 6. healthy social ecology, 7. sustainable economy 8. Community participation, 9. Protection of the local culture and social values. Coming to the working method; on behalf of the sustainability Wheeler's 9 working areas will be discussed along with the approaches enabling the planning of liveable cities. With this method it will have the opportunity to regain its lost economic, ecological and social values.

Theoretical Framework Of The Study

The protection of natural environment, liveability and ecologic parameters have been presented in the theoretical framework in the study. Within

the scope of the study, the aim is to ensure the sustainability of the liveability and to protect ecological parameters of the environmental pollution which causes abandoned mine waste. It is essential to overthink the thought of the refuntoning of the abandoned industrial areas and the dimension of the sustainability of the planning studies.

As a part of the conceptual study, the concept of sustainability aims to meet economical, environmental and social requirements as key concepts of the attitude of developed countries towards the planning system of ruling a country without harming the living conditions of the posterity. With this concept, the ecological sustainability is being used as a base in order to ensure today's and future lives in this world. In the vital loop solutions for the problems we meet in physical areas such as environmental pollution, ecological balance and climate change can be improved by examining them together with the concepts of sustainability and ecological concepts with architectural discipline and field of application (Akgündüz, 2013). Within this framework, livability is a multi-concept which is not certain and has no universal definition. While this concept can be a living environment which is liveable in one part of the world, it can be perceived differently in another place. The meaning of the urban liveability can vary in terms of time, the purpose of the evaluation and the value systems of the evaluative.

However, the concept of liveability holds its force in all cases and is a common political target of different stakeholders (Oktay, 2007). In this direction, the concept of liveability should also be added to the ecological concepts revealed with the sustainability. In this way, the approach of sustainability planning should accompany the ecological parameters which have been harmed in the ensurance of the liveability of the industrial areas.

Sustainable Industrial Environment

The sustainability of the environment is possible at local level with the application of the sustainability process conditions. The existence of the institutions and organizations which are concerned especially with refuntoning abandoned areas supports this idea. Accordingly, the sustainability aimed at bringing into being the areas with wastes is a concept that should play a part in all scales of planning and development studies and constitute a frame of a general

overview. The Rio Convention and Kyoto protocol bring up the necessity of applying the principles in the sustainability of the environment for the industrial areas which are active or made a break with their work.

It is necessary that principles for the process of the settlements which protect ecological values and for ensuring the living areas which balance the relationship between humans and nature are being formed by the planning of the areas with anthropogenic pollution.

It is necessary that the nine basic fields of study Wheeler, are carried out in which the reflection of the success of the application will be monitored and which will direct the development of the sustainability in the industrial areas (Wheeler, 1998). The principles and the declinations revealed for bringing the abandoned areas into use actively by institutions and/or organizations are;

1. The compact presents the protection of the flora and fauna in the ecosystems within balanced land usage. Abandoned waste areas hinder the usage aimed at the protection of the ecosystems. With this the expected type variety in the area decreases or shows an alteration.

The requests for the land use for these areas should direct the potentials within the present settlements and should be organized in a way that the needs within the period of development can be met within the scope of a productive planning.

2. Use of vehicle and easy access is a principle of sustainability which suggests that the usage of an individual motor vehicle causes air pollution and suggests the usage of bicycle, accumulator vehicle and walking. They take on a task as a barrier in the areas as the usage of abandoned waste areas are not suitable healthwise. So the healthy access such as walk ways and bicycle ways, accumulator vehicle and animal power which can provide for sustainability area not supported by these areas.

3. The wise use of the resources, the reduction of the wastes and the prevention of the environmental pollution supports the usage of nature friendly renewable energy resources by reducing the usage of the nonrenewable energy resources to the minimum. The fact that the abandoned industrial areas are present as abandoned waste areas among settlements causes air, water and land pollution. Studies on decreasing waste are essential for the planning studies made to protect the natural resources.

4. The restoration of the natural systems presents the renovation by protecting the topographical features of the natural structure of the environment, open areas, valleys, channels, guttering, green hallways and areas. Above the environment in which the abandoned waste area is present, problems can be observed in formations such as green areas, valley, canals, gutterings, caves, green hallways and open areas. These formations should become integrated with the settlement, supported with walking tracks and brought into the society. The disturbances caused by the usage should be reconstructed and brought into being. If there are any ecological restorations, they should put emphasis on it sensitively in achieving buildings and work with experts.

5. Good housing and living environment is an approach which supports the protection of the traditional building areas and natural construct values. It is essential that the abandoned waste areas are being thought along with traditional and nascent housing zones. In case of not making such planning studies respectfully towards the present texture, environment and natural structure making the environment liveable would not be possible.

6. It forms a principle which prescribes the conditions necessary for a healthy social ecology, social equality, and fulfilment of basic needs of the people, sufficient job opportunities and social life.

The abandoned waste areas which affect the natural environment negatively becomes the reason for problems in the formation of social and healthy living areas besides meeting human basic needs. The reintegration of these areas into the society matters in the formation of liveable environments. Projects should be developed aimed at protecting and improving natural systems for social health. These should predict social equalization, meeting human needs, forming sufficient job opportunities and essential social life conditions.

7. The sustainable economy has been presented with the formation of conditions which will make the use of resource easier for the posterity and the development of policies with the equal distribution of the public welfare. The abandoned waste areas cause problems in handing down the next generations with resource use which is important in ensuring liveability. In such a situation it is not possible to mention about a sustainable economy in the cities or rural settings. In order to change this, cleaning the abandoned waste areas becomes vital.

8. The public participation is one of the principles that supports equality, equal distribution of resources and the right of the community of having a voice in the production of policies that will ensure the distribution of the welfare for every district. One of the most important components in the reintegration of the abandoned waste areas into society is to step in the area by forming more functional, free from politics and local regulations. The way of providing this is to form local progress politics oriented at abandoned industrial areas. Increasing the non-governmental organizations of the area which bring together groups of sensitive citizen, social involvement and communion are expected. With this, a period is in progress in which public cooperation or representation is present in the planning decisions which effects the whole progress of the area.

9. The protection of the local culture and social values supports the protections of the natural resources and local architectural texture. The local culture and its sustainability, the traditional social life of the community, their relations among each other and the number of tourists in the abandoned waste areas are being affected negatively. Accordingly, the state and subnational administration should take a role as a follower in the protective measure taking of the agricultural production, natural resources, local architecture and settlement texture and its implementation. In this direction, liveable conceptual frameworks and sustainability were used for the abandoned waste areas (Wheeler, 1998).

A Conceptual Framework For The Sustainability Of The Natural Settlements

The formerly industrial areas appear to us as settlements whose ecologic and natural areas are ruined and whose liveable boundaries are at a low level. These areas can be accepted into society only if they are thought as a whole within the settlements. For this the ecological sustainability through the constitution of the use of the non-industrial areas along with its natural and architectural environment, climatic features, bio-diversity (flora-fauna), and topographic structure with natural resources can be ensured. The ecologic, cultural, social and economic resources of the areas which will be restored are important factors in the studies of non-industrial regional area planning. Discussing all the parameters of these resources in the decision-making process the planning steps will be formed.

The prospective unplanned and uncontrolled development of the industrial areas is affecting the ecological parameters negatively and is bringing up the issues of the unlivability in the living areas.

The reduction of these effects is only possible with planning approaches which enable the ensurance of the sustainability by integrating industrial idle areas into liveable areas. For this reason, the area has to be a production of a multidimensional integrated planning of the development before it joins the structuring. Within the scope of planning, besides the ecologic, economic, socio-cultural features, related sectors and social participation should be included in the approach.

There is a need for an attitude with a method which should be specific for the planning and regulation by bringing the anthropogenic pollution areas into being. In this direction, the data collection and the evaluation process should be taken in hand with data collection and expert staff while the systematics of the spatial and functional analysis are being constituted.

The natural resources (water resources, available natural resources) and physical resources (topographic structure, present settlement style of the region, architectural texture) are factors which need to be taken into consideration in terms of the liveability of the industrial solid and liquid waste areas.

There is the need for determining data which is necessary for the planning by its analysis and synthesis. In this way, with the gathered data it is possible to switch to the spatial planning as part of the sustainable ecology and formation of the conceptual framework of the abandoned waste areas. So the decision-making authorities in the planning can act as counsellors for the liveability of industrial waste areas and the sustainability of the ecological parameters.

The sustainability of the ecological parameters are of great importance in the Island of Cyprus in terms of liveability. It is necessary that liveable areas are transferred to the coming years which is essential for the protection and sustainability of ecological parameters and that the living quality is improved. So the principles in Wheeler's nine work areas should be evaluated ecologically and in terms of the liveability of the industrial areas. In this direction, the principles should be

considered within the industrial or urban development planning for abandoned waste areas.

LEFKE CMC ABANDONED WASTE FIELD DATA

The Cyprus Mine Corporation (CMC) copper mine deposit waste area, which has been chosen as the field of study involves the situational assessment of today. Studies can be found for abandoned CMC area revealed by public institutions or nongovernmental organisations. As part of these studies, they should try to open areas of high land value and with land clearing for use as free port. So the fact that the idea of a port which was important in the transportation of copper in the period of CMC was reawaken increases the necessity of the sustainability planning studies.

The progress of the Lefke region within the historical process, copper mine and CMC

The most important work in the historical literatures for the described natural resources was made by the American engineer Charles Godfrey Gunter who came for being present in the mineral explorations in the Middle East in 1913. As a result of the study plenty of sulphur and copper mine was found in the hill called Foucassa situated in the town of Lefke. With the evaluation of the owners of the American mining companies Philip Wiseman ve SeeleyWintersmith Mudd on the report as part of the studies of Godfrey, CMC was officially established being appropriate to New York state laws in 1916 (Bear, 1963; Lavander, 1962). In this way, it was ensured that

the deposits in Lefke got open to the whole world. It is a known that the industrial development was encouraged by the fact that the island of Cyprus has been rented to the British colony by the Ottomans and that the CMC company has received permission for the mineral exploration.

Experts and boring machines were brought from the United States to Lefke for being used in the mineral exploration. In 1916, started production of chalcopyrite from an underground mine at Skouriotissa (Foucassa Hill) shortly after the end of World War I. After continued prospecting and delineation of the orebody under Lefke, work on the underground Mavrovouni (near Lefke) mine began in 1926. The first production of ore began in 1929. Coincident with mine opening was construction of the new village of Xeros, a nearby jetty in the bay and new workers homes near Lefke (Lavander, 1962). The workforce consisted of the Turkish Cypriots and Greek Cypriots of that area.

The first ores exported from Skouriotissa were shipped from Famagusta and Pendaia. Subsequently, ores from the Skouriotissa and Mavrovouni mines were taken to the jetty at Xeros by newly-built railroads, and then shipped overseas for concentration and smelting. (Fig. 2) The only processing of these early ores consisted of crushing to uniform size, which was handled by primary crushers at the mine sites (Wilson & Ingham, 1959). In this way expulsion of the copper mine was ensured the first time in Cyprus. In this direction, Lefke continued its rapid progress in the industrial field.



Thickening ponds at Xeros. Behind them are Units for Leaching, Grinding, and Floating (Photo:R. J. Hendricks)



The Original Jerry at Pendaia, a barge and the Tug Foam Alongside (Photo:Gordon S.Duncan)

Fig. (2). Ports Operated by CMC. History of mining in lefke. www.gucsen.org/.../HISTORY-OF-MINING-IN-LEFKE.doc. 28. August.2017

Besides that, along with the increasing job opportunities as a result of the developments in the mine in Lefke, domestic migration started. With the population increase unhealthy living quarters occurred. As a result of this, the blood disease malaria came along. First of all, eucalyptus trees were planted for drying the marshes along the way in order to prevent malaria. As a result of the decrease in the workforce due to diseases the company owners constructed liveable housings so that the workers survive those problems with the least damage. The constructed housings are gathered in four main groups. These are; bachelor worker pads, married worker homes, headworker homes and engineer homes (Dağlı, 1999).

Besides that the crowdedness of the area due to working manpower, the fact that the area is surrounded with marshes and that the increase in the diseases such as malaria, pneumonitis and cholera due to worsening of social and economical conditions causes sickness of the workers and hinders the normal operation of the mine. With this reason eucalyptus trees which were imported from England were planted to dry out the marshes. Also for the treatment of the labour the Pendency hospital was constructed in that area, which is known today as Cengiz Topel Hospital, in order to reply to the increasing population and to control the health standards.

Health and social aid projects were passed in for the partners and children of the workpeople as a result of the ever-growing number of the population. At first education before birth and upbringing education were provided for the child development. Later on seven primary schools were opened in that area so that the partners and children of the workpeople could complete their education and herewith to solve educational issues in that area (Lavander, 1962). A factory was built to ensure the mine industry which was constructed next to the harbor in line with the needs and the increasing job opportunities after the second workforce village was established. The factory which was built in 1926, built its first pilot copper flotation plant at Xeros in 1939. In this way, the hand-tooled copper finally transferred to industrial production. 200.000 tonnes of copper mine were produced monthly in the facility which is being operated with fabrication method in 1934.

In 1950, construction an acid-leaching facility and sulfuric acid-producing auto-oxidation plant

began at the CMC plant in Xeros. These would be used to create dilute sulfuric acid from locally mined pyrite which would then be used to leach soluble copper compounds from crushed ore prior to floatation processing (Wilson & Ingham, 1959). In this way, very dangerous chemicals were brought to the island for being used in facilities.

In short, the settlements in Lefke settlement achieved improvements in the fields of industry, health, education and housing between the years of 1913 and 1939. These developments have been one of the first small scale industrial developments in Cyprus. But the CMC Company, which made a pause on the activities during the Second World War, has turned the workman homes built in Gemikonagi (Xero-Karavostasi), Suriotissa and Karadağ in 1942 into a rest camp for the British soldiers who fought in North Africa. Besides that, many Greek citizens who flee from the German occupation were also hosted in the CMC buildings. Mining was restarted after the war in 1946. The method of tunnel mining was being used until the beginning of 1960. After 1960 there was a switch to open cast mining which was a mining system with a complete control over the work tools. With the evolution of new methods the process of mining with better usage of machines which are independent to human labour began over time.

The industrial development with CMC

A small reflection of the industrial development in the second half of the 18th century in England was seen in Cyprus. As a result of the industrial development in Europe a new period of development came with the replacement of hand labour with mass production and the export of goods in a short span of time. The CMC Company enabled the use of resources and the establishment and development of industrial facilities and provided job opportunities for a great number of people. The richness in terms of raw materials of that area enabled the establishment of fabric cities and the export of trimmed or raw material to overseas.

The Famagusta harbor which showed development during the British period and the railway mine transport between Lefke-Famagusta became an important factor (Turner, 1979). Especially because it provided an opportunity for the export of the deposits produced in CMC to overseas. The railway was being used to reach the Famagusta harbour from the inside of the mine. The Famagusta harbour

was the only Access to European countries in that period. For this reason, the use of Famagusta harbour for the export of copper made a huge contribution to the establishment of a coastal town.

While the Famagusta harbour which is open to Europe is still being used the railway is not being used nowadays. The locomotives in the railway

which were constructed for CMC used to carry people and cargo. The railway has shortened the long distances. The facilitation of the transportation on the island made it possible to travel to different cities. In this way, the railway has brought liveliness to all cities. (Fig. 3)



Fig. (3). The Unused Railway Transport of CMC of Today.

In short, it is known that CMC actually had important industrial contributions for the whole island of Cyprus. The first factory buildings and the fact that the first samples of buildings made of worldwide popular tools (beton, steel etc.) in the industrial period were from Cyprus are of great importance for the literatures. The Lefke area which was a growing industrial city has stopped the activities due to political reasons in 1974. The CMC which was not able to move on anymore caused the unemployment of many people and the beginning of domestic migration. (Fig. 4)

Here it is important to mention that the demise of copper mining was not the result of lower prices or energy costs. Rather it was the result of the island's crisis. So we can assume that if the CMC Company would have continued with its actions after 1974 the island might be in a position to compete with important industrial zones worldwide today. But the dimension of destruction might have been worse than its abandoned condition if they would have continued working with high petrol or low mine costs.



Fig [4]. The Current Idle Situation of CMC

Havadis Gazetesi (Lefke'de CMC Konusunda Eylem Yapıldı). <http://www.brtk.net/cmc-konusunda-bakan-atuna-cagri-sozlesmeyi-iptal-edin/> 17.Mart.2017.

In brief, the economic well-being, orderliness and liveliness in Lefke brought by the company which made the best of the underground treasures between the years of 1912-1974 cannot be ignored. But the open deposits of the abandoned company buildings after 1974 caused serious environmental issues. Scrapping the installation for metal might be helpful to pay the cleanup, but the risk with abandoned wastes are probably high.

The environmental issues after CMC and its effect on the ecologic parameters

Within the scope of copper mine works CMC used a dangerous chemical called "Cyanide" to obtain raw materials in the ponds they made since 1932.

Cyanide is a chemical that is increasing the poorness of the land, causing air pollution when contacting with air and water pollution when contacting with water. The fact that all deposits of CMC Company were open, the poisoned water got mixed into the sea due to the explosion of the cyanosis podsand and the mine dumps unbalanced the ecology in Lefke.

Although the effect of the cyanide has lost its effect today, according to the report of the United Nations Office for Project Services (UNOPS) the chemicals which are used in the facilities and are still or might be present at some facilities are: sodium cyanide (NaCN), sulfuric acid (H₂SO₄), sodium sulfide (Na₂S.9H₂O), potassium ethyl xanthane, sodium ethyl xanthane, carbon disulfide, pine oil, superfloc HX-300, trichloroethylene and arocholor 1254 (PCB).

Besides the chemicals containing carcinogen such as the dangerous xanthate of about 200-250 tubs which are inside the CMC facility and spread around, potassium amyl xanthate, very strong acid, iron of metallic ion, copper, bullet, chromium, and Sulphur which is not cobalt and metallic caused the begin of environmental pollution in water, land and air (Bildir, 2000; Cansu, A).

Another important point is that pyrites (FeS₂) and chalcopyrites (CuFeS₂) which occur on the surface and are sulfurous create pollution parameters in regional surface waters environmental soils, seaside, sea water and in underground waters and intensify the acidity in the waters next to the wastes on the land surface through the reaction of rain water and free oxygen (Oktay, 2000).

Both the flora and the people got seriously affected by this situation (Fig. 5). It is known that

the majority of the community especially living near the settlement areas close to the wastes had to deal with diseases such as goitre and cancer.

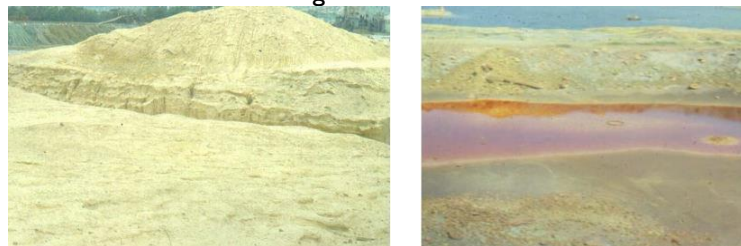


Fig. (5). The Chemical Wastes Spreading around the Environment (Altınbas et al, 2002)

The fact that it is forbidden and dangerous to enter the CMC Company which is now under cover of the British guarantor could not hinder environmental issues. Because, the main pollution (for instance: waste heaps) which transfer pathways (surface water, rain or wind-borne particles) and receptors (villages, agricultural and pasture fields, sea, pond) are quite effective.

In short, CMC has negative effects on the environmental ecologic parameters on the whole island of Cyprus and the Eastern Mediterranean. The problems occurring with the reconsideration and cancelling of the "Port Isbi" contract, which rented the CMC area for a long-term, is increasing the dimension of the issues. This contract was signed by Portlsbi Cyprus Free Zone & Marine Logistic Company with the management of free zones in 2008. According to the contract; it was compromised of the removal of the waste mines in Gemikonagi CMC and the usage of the area as free port.

Discussion

The damages of the idle situation left behind by the CMC Company are much more substantial than thought for the environment and the human health. The damages in the ecological buildings of the area should be repaired by bringing up the damages the mine wastes continue to give to the environment.

The handling of the whole Lefke settlement and its participation to liveable areas was seen as appropriate in the ensurance of the sustainability in Wheeler's application in the work field in which he presented 9 principles in line with the

sustainability. Accordingly, the following schema is a sample of how to transform the unused chemical waste areas to liveable areas by including them into the compound. (Table 1)

Table 1: A sample schema aimed at ensuring the liveability of waste areas.

Wheeler Principles	Assessment of liveable Areas	CMC Industrial Area Situation	Assessment of Lefke
1. Compact, balanced land use	A usage which is oriented to the protection of the ecosystems (biological diversity) in the land use should be considered as appropriate.	Abandoned waste is killing the biological diversity of the land use in the fields.	The growth within the development period and needs should be suppliable with the guidance of the problematic areastowards potentials in the settlement areas within the use of a productive planning.
2. Vehicle use and easy access	A planning which would affect an environment which has too much usage of individual motor vehicle and less public transport.	Abandoned waste areas offer pedestrian, bicycle ways, and formations of healthy transportation such as accumulator vehicle and animal power.	There is the need for providing the transformation of the abandoned waste areas into liveable areas for the reduction of the usage of individual motor vehicle and the increasement of the usage of accumulator vehicle, bicycle, walking or animal power.
3. Wise use of the sources, reduction of wastes, prevention of environmental pollution	Importance should be given to an approach which is nature friendly in the ensurance of a planned and wise use of natural resources. Also the use of nonrenewable energy resources should be minimised.	The fact that industrial areas are causing water, air and land pollution within the settlements prevents the wise use of the natural resources.	In order to prevent pollution and to protect natural resources the creation of liveable areas which possess revewable energy resources are being suggested.
4. The restoration of natural systems	Topographical features of the natural structure of the environment, green areas, gutterings, valleys, channels, green hallways and open areas should go in line with the settlement on behalf of the liveability.	The environment will not be able to adapt itself to the change due to the ignorance of the present chemical wastes and the destruction of the topographical, green areas, valley, gutterings and open areas.	The beginning of cleaning the abandoned wastes and the renovation of the environment is necessary for the ensurance of the liveability in the restauration of the natural systems.
5. Good housing and living environment	Importance should be given to the combination of the traditional building areas and natural construct values in liveable areas.	The CMC area has left the present settlement and is affecting the natural environment negatively.	There is the need for a plan which is appropriate to present tissue and environment in the participating of abandoned waste area settlements and respectful towards the natural construct.
6. Healthy social ecology.	It predicts the formation of conditions which are necessary in the terms of social equality, basic needs of people and sufficient job opportunities and soical life	The CMC area which is an abandoned waste area is not able able to meet social and healthy living conditions.	It presents the process of a planning which will ensure the liveability of the CMC area which is affecting the health and social life negatively in that area.

in the ensurance of the liveability.

7. Sustainable economy	For making the use of resources easier for the posterity and for the development of policies conditions should be formed and presented in line with an equal distribution of the public welfare.	Due to the existence of areas which pose a threat to the posterity industrial chemical waste areas cannot meet the liveability conditions within the sustainable economy.	First of all, cleaning policies aimed at handing down the chemical waste areas to next generations and the equal distribution of the public welfare should be ensured.
8. Community participation	The community should have a voice in in the production of policies ensuring the distribution of welfare for every district and equal distribution of resources.	Even if there is an association including the participation of the community it should further develop for being able to continue its works activey.	Some immediate precautions against abandoned wastes are urgent as a response to the reactions of the community.
9. Protection of the local culture and social values	Taking precautions for the protection of agricultural output, natural resources and local architectural texture is important for the ensurance of liveability.	The chemical wastes are also problematic for the architectural texture due to its bad influence on the natural resources and agricultural output.	The area should be cleared of chemical wastes and natural resources be integrated into the society.

Generally these 9 principles have been presented to secure the cleaning of the abandoned waste areas and its liveability. The study results related to the transformation of the abandoned waste areas into liveable areas;

1. The compact balance landuse; It was observed that flora and fauna of the land in which the CMC is situated, has lost its persistence throughout Lefke. Accordingly, the land use requests should be reorganized within a productive planning and by directing towards the potentials of the present settlement areas in the retrieval of the ecological values.

2. Vehicle use and easy access; the common use of accumulator vehicles are required instead of healthy transportation such as walk ways and bicycle ways which can be effective in the sustainability. With this it is possible to provide liveable, healthy and easy access in the Lefke settlements.

3. Wise use of the sources, reduction of wastes, prevention of environmental pollution; It reveals that the abandoned CMC area has problems in using the natural resouces due to wastes which get mixed in water, land and air. The use of renewable resources should be supported

besides the wise and planned use of the resources.

4. The restoration of natural system; Problems arising from the topographical features of the natural structure can be observed in formations such as green areas, valley, canals, gutterings, caves, green hallways, open areas. These formations should become integrated with settlements, supported with walking tracks and gained into the area.

5. Good housing and living environment; it is being revealed that the abandoned waste areas hinder the development of a liveable environment in which traditional and natural environment become integrated. It is important that the planning approach in which the settlement texture of the area was integrated was put into practice.

6. Healthy social ecology; The abandoned CMC does not offer healty living conditions for the living due to its destruction in air, water and land. Also, social equality is of great importance for the area in meeting human basic needs and developing planning studies for job opportunities.

7. Sustainable economy; abandoned waste areas become an issue in the handing down the generations with resource use which is essential

in ensuring liveability. In this context, the necessity of forming politics aimed at the decontamination of the wastes in the area is being revealed.

8. Community participation; the necessity of increasing the non-governmental organizations of the area which bring together groups of sensitive citizen, social involvement and communion with the aim of reintroducing the CMC area has been revealed. With this, developing a period planning in which public cooperation or representation is present in the decisions which affect the whole progress of the area becomes possible.

9. Protection of the local culture and social values; the local culture of Lefke and its sustainability, the traditional social life of the community, their relations among each other and the number of tourists in the abandoned waste areas are being affected negatively by the CMC waste area. Accordingly, the necessity of starting the planning studies for the measure taking of the settlement texture and in the implementation, the local architecture of the natural resources and the agricultural production of the state and subnational administration is being highlighted.

In this way, the existing political disunity in the island of Cyprus since 1974 caused the separation of the CMC Company – one part in South Cyprus and one in North Cyprus. A solution for CMC which is the concern for both parts of the island should be found in the joint activities. The suggested work for this area includes;

- The cleaning of the present cyanide and desulphurisation of the area (pods, underground waters and land)
- Environmental formations for the cleaned areas
- The disinfection of the area of the unused industrial material wastes of the CMC company

All works made on the prevention of land, water and air pollution should be controlled regularly every year on the basis of the European standards. Also the production of new projects and raising awareness of the local community is necessary for a much more liveable region.

In short the abandoned waste areas should be reintegrated into the society and problematic areas should be prevented for the next generation.

Conclusion

The abandoned waste areas cause trouble in the formation of liveable areas. The politics which will be carried out within the sustainability planning studies are of great importance in overcoming this problem. In this direction; the priority of the purge of the abandoned waste areas is important in the ensuring of the sustainability in the city or rural areas.

The planning studies which will be used for getting off these areas are:

- Effective in the reintroduction or protection of the ecological values considering the user needs of the center of population and the problematic area of the land.
- Creating the transportation network which supports the easy access which will give opportunity for the integrated usage of the problematic area and the centre of population;
- Supporting the wise use of damage prevention of the problematic area with the natural resources;
- Giving opportunity for the remodeling of the blasted, topography, green areas, valleys, canals, gutterings, green hallways and open areas;
- Giving importance to the current domicile texture and environmental relations;
- Providing the community with a healthy social living area in the regulations for the abandoned waste areas;
- Giving an opportunity in handing down the next generations with resource use in the regulations for the abandoned waste areas;
- Working together with the community, civil society and public organizations;
- Forseeing the formation of politics regarding the protection of the local culture and social values.

In this direction, there is the thought that the formed planning politics will provide an opportunity for the reintegration of the abandoned waste areas into the society and the formation of liveable cities. Otherwise problems increasing day by day are inevitable.

Acknowledgements

This research didn't receive any specific grant from funding agencies in the public commercial or not-for-profit sectors.

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