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An Investigation of the Environmental Effects of South Antalya Municipal Solid Waste Landfill Sites and Integrated Waste Management Alternatives

İrfan Erdoğan

Ankara Üniversitesi İletişim Fakültesi, Ankara

Nazmiye Ejder

KTU Orman Fakültesi, Peyzaj Mimarlığı Bölümü, Trabzon

Abstract

The primary objective of the present research is to study the environmental conditions and effects of the Municipal Solid Waste (MSW) Landfill sites in Southern Antalya region and evaluate findings in terms of environmental Protection, the stated waste management objectives and daily operations, and provide discussions on the management issues. Three MSW landfill sites in the region were selected for the study. Data were collected by Means of (a) field observations, (b) findings of the pilot study conducted for the GATAB, (c) and supported by pictures. Based on the data, qualitative evaluations were made. It is found that (a) the MSW management is based on unsanitary and environmentally irresponsible landfill practices, (b) The landfill sites are polluted by the waste and (c) there are potential dangers not only to the immediate environment, but also to the nearby communities, especially to human health, flora, fauna and soil. Some serious corrective measures in the landfill sites are required, but not sufficient. Sanitary landfill system with continuous monitoring and periodic auditing and environmental impact assessment is necessary. Yet, environmental solutions shouldn't be confined within the sanitary landfill system. Modern landfill is not the answer, because it is not a permanent solution: It only postpones the problem for 30-40 years. Thus, establishment of an integrated waste management system is imperative: Modern waste management requires the use of integrated system emphasizing primarily the prevention, reuse and recovery.

Key Words: Landfills; Management Policy; Solid Waste Management; Integrated Waste Management.

Özet

Araştırmanın temel amacı Güney Antalya Bölgesindeki Dolgu alanlarının durumunu belirlemek; atık yönetimi ile yönetim projesi arasındaki uyumu saptamak; atıkla ilgili projenin ve proje yöneticilerinin iletişimlerinde ilettiği ile uygulama arasındaki ilişkiyi araştırmaktır. Bu amaçla üç araştırma soru grubu geliştirildi:

1. Dolgu alanlarının yapı ve yönetim özellikleri nedir? Dolgu alanına taşınan atıklara ne yapılmaktadır? Atık yönetiminde ne tür yöntemler kullanılmaktadır?
2. Atık yönetimi bağlamında GATAP projesinin belirtilen (ilettiği) amaçlar nelerdir?
3. Yasal atık kuralları dolgu alanı yönetimi ve denetim bağlamında ne tür karakteristiklere sahiptir?

Araştırma sorularına veri toplamak için alan gözlemleri, yazılı materyal içeriği analizi ve yöneticilerle anket-mülakat yapıldı.

Araştırmanın bulgularına göre:

1. Projenin belirttiği amaçlar ile uygulamalar ve yönetimin iletiştiği arasında tersine bir ilişki bulundu: Söylenenlerle yapılanlar birbirine uymamaktadır.
2. Yönetimin kendi değerlendirmesi ve bu değerlendirmeye dayayan durum iletişimi ile, gerçek koşulların ilettiği arasında fark bulundu.
3. Ne ALTAŞ ne de kamu yönetimi tarafından hiçbir denetim, gözleme, auditing ve değerlendirme yapılmamaktadır.
4. yasal biçimlendirmeler denetim ve yönetimle ilgili konularda hiçbir belirleyicilik taşımamaktadır.
5. Çevre Etkileşim raporları sadece bürokratik gerekleri kağıt üzerinde yerine getirmekten öte gitmemektedir.
6. Güvenli çevre politikası GATAP projesinde kağıt üzerinde iletişilenden öte gitmemektedir.

7. Sorun bilinç ve eğitimle ilişkili görünmemektedir, çünkü projeyi hazırlayan ve yürütenler en yüksek eğitim seviyesinden geçmiş insanlardır. Araştırma, sorunun kişisel çıkarların ve minimum yatırımla maksimum fayda sağlamanın egemen olduğu bir "iş yapma kültüründe" yatmakta" olduğuna işaret etmektedir.

Projelerle uygulamalar arasındaki farklılığın ortadan kaldırılmasının öncelikle iş yapma kültürünün değişmesinde yattığı görülmektedir.

INTRODUCTION: PROBLEM AND OBJECTIVE

All over the world waste generation has been increasing rapidly. Non-organic materials and industrial waste have being discharged into the environment. Amounting non-biodegradable waste products accompany these increases. All forms of disposal have negative impacts on the environment, public health, and Local economies. Landfills have contaminated soil and drinking water. Waste burned in incinerators has poisoned air, soil, and water. The most water treatment systems have changed the local ecology.

The traditional waste management has been the disposal by means of dumping and landfilling. Especially since 1980's, landfilling method has been facing with the problem of finding new sites because of increasing community opposition all over the world against the landfilling practices and undesirable and hazardous outcomes.

As Nath [1993] acknowledges in his research, since the middle ages in Europe local laws in European towns brought the rule of collection of waste in a certain place. The first public sanitation service emerged in industrialized cities and large towns in 19th century. Later, larger landfill sites were used and incinerators were used. Waste management became a centralized system.

Another development in waste issue is the development of economical provisions and incentives in order to control the waste generation and to encourage alternative methods. In 1970s, governmental and non-governmental environmental agencies increasingly emerged. Research and development funds for waste prevention and management were established. 1980's and 1990's, new control measures were taken in national and international levels concerning waste generation and prevention. Use

of some chemicals in packaging were banned. "Polluter pays" rules were accepted in some countries. European Commission, in 1994, came up with "green paper" suggestions.

Meanwhile, exporting waste created a new terminology: waste tourism. European Commission introduced "proximity principle" in order to stop waste tourism. In the process, waste management regulations quantitatively and qualitatively increased in many countries.

Currently, municipal disposal is the dominant method of waste management in Turkey. Prevention by means of reduce, reuse and recycle is not a significant management practice. Disposal sites are open-air sites in Anatolia; National Parks and forests are used as legal and illegal waste disposal sites causing artificial changes and environmental destruction (Kocasoy, 1995). On the other hand, modern waste management projects were developed especially in areas, such as Antalya region, where heavy concentration of tourism exist.

In Turkey, environmental studies has been steadily increasing since 1980's. Most of the studies in 1990's focus on the environmental conditions in various parts of the ecosystem and provide valuable suggestions. Çağlar'(1991: 14) found in his study that air pollution (% 63.48) first and waste second problem among the most important environmental problems in Turkey. Keleş (1992) indicates that we can't be successful in environmental protection unless concerns for ethical responsibility are made dominant in peoples' behavior. Emphasizing the need for sustainability, Sönmez [1992:62] argues that sustainable agriculture and soil protection practices are fundamental imperatives for protection, development and perpetuation of life on earth. Sözen, after examining the relationship between man and nature, [1992] suggests a relation oriented towards living in harmony with nature, instead of domination over it; less consumption, more rational use, less luxury but cleaner environment, more humble living and more nature and green, cleaner air and water; less variety but healthier nutrition. Aruoba [1992] approaches the issue in terms of economics and sustainability. İmamoğlu [1992] focuses on psychological approaches to the man and environmental relations. Taking U.S. Environmental Protection Agency's integrated ecosystem management policy as starting point, Ejder and Erdoğan [1997) move beyond individual behavioral and socio-psychological level and

argue that the question of environment can not be reduced down to consumer behavior and awareness; It is a societal structural condition, thus all the other important factors, from production to consumption, have to be included in investigations.

Most of research and discussions show that the only way to avoid environmental harm from waste is to prevent its generation. As it is stated in Epa (1994) Prevention means changing the way activities are conducted and eliminating the source of the problem. It does not mean doing without, but doing differently. For example, preventing waste pollution from litter caused by disposable beverage containers does not mean doing without beverages; it just means using refillable bottles. Preventing pollution in a sensitive resource-related setting means thinking through all of the activities and services associated with the facility and planning them in a way that generates less waste. Waste prevention leads to thinking about materials in terms of reduce, reuse, recycle. The best way to prevent pollution is not to use materials that become waste problems. When such materials must be used, they should be reused. Materials that cannot be directly reused should be recycled.

Due to developments especially in last 30 years, the question of what to do with waste has grown to be a key issue. Taking the issue as the central point of departure, the primary objective of the present research is (a) to determine the environmental conditions and effects of the Solid Waste Landfill sites in Southern Antalya region and evaluate waste management practices in terms of study findings and the project statements, and finally provide discussions for alternative integrated MSW management options.

As Yücel put forward in 1995, the environmental problems in Turkey have reached serious dimensions, despite nearly 600 regulations and many research activities. Curi [1991] too put the same issue under investigation and indicated that the 1991 Control of Solid Waste Act is also insufficient in solving the waste problem. These research findings suggests serious problems with the laws and regulations. The present study also aims at evaluating the waste management in terms of relationship between regulations and waste site operations.

METHOD

Research questions

Undoubtedly, monitoring and evaluation are essential to ensure that compliance measures are properly carried out during the construction and daily operations. Regular monitoring and evaluation would give a clear picture of the accurate environmental assessment, which can be used to further fine tune the forecasting methods and management policies. Absence of proper monitoring and evaluation is a major handicap for carrying out reliable environmental assessment (Biswas, 1994) The first two research questions are related with assessment of environmental conditions in the waste disposal sites.

1. Adherence to the principles of environmental protection and to the stated objectives in site construction and waste management operations: What are the construction and operational characteristics of the waste site? What is done to the waste carried to the landfill site? What kind of methods are used in waste management?

2. objectives of the project about planning and operating the landfill site: What are the stated objectives of the project in terms of waste management?

3. Relations between the legal provisions and waste management practices is an important issue in terms of regulating the waste management procedures. The third question is about the evaluation of the environmental regulations in current waste management projects and operations. What characteristics do waste regulations have in terms of legal control and site operations?.

Data Collection and measurement

In order to collect information\data for the first question group, site observations and management interviews, and for the second question, Southern Antalya Tourism Infrastructure Project, known as GATAP documents and interviews with the company management that runs the waste operation, known as ALTAŞ, were used. The information for the 3rd question was extracted from the documents, interviews and observations.

The study is a qualitative and quantitative descriptive-evaluative investigation, Qualitative side is because bulk of information\data was collected by using the written texts and field observations. Quantitative side is because some data were collected by means of survey questionnaire.

Three waste disposal/landfill sites in the region were selected for the study: Agva Deresi, Ulupınar and Fenike waste disposal Sites.

FINDINGS

Waste Disposal Sites: Statements in development project

South Antalya Tourism Infrastructure Project, known as GATAP include counties of Beldibi, Kızıltepe Göynük, Kemer, Aslanbucak, Beycik, Çamyuva, Tekirova, Çıralı and Adrasan. Waste disposal management were given to Infrastructure Tourism and Management Inc., knowns as ALTAŞ by South Antalya Tourism Infrastructure Association.

Ulupınar waste disposal site: Ulupınar site was accepted by the 1995 GATAP and put in operation at the end of the year. The site is situated between Tekirova and Ulupınar villages. The site is 2.5 km away from the highway.

According to the Preliminary Report on the solid waste disposal facility (1991):

- Characteristics of the proposed site construction reflects the criteria used by The U. S. Environmental Protection Agency (EPA)
- Selected area which was 16 ha is suitable for the landfill.
- There is no ground water running and underground water in the area.

An Environmental Impact Assessment study was conducted in November 1995. According to the report the site is 6-7 km away from the nearest town and has no adverse impact to the town in terms of smell, dust and noise pollution. The site projects indicates that the collection of organic and recyclable/reusable material (glass, aluminum and other metals, plastic, paper, corrugated paper) will be separately done. The site will be maintained in sanitary conditions. There will be a last cover before the

landfill closed and the closed area will be vegetated with short stemmed flora; Thus, when the use of site completed, the area will be in harmony with its environment.

Finike waste disposal site: Finike Town is within the Southwest Coast Environmental Project coverage, Finike is an important tourism area by the Mediterranean sea situated to the west of Kemer and Kumluca. The project, after analyzing various options, emphasizes only in landfilling for waste management and finds the other alternatives economically not feasible.

Agva Site: Agva site was used for waste disposal before Ulupinar. It was indicated in the 1991 report that: An operator runs the business. The waste is dumped as is inside ditches, then Workers separate the recyclable in the waste by hand. The site is close to drinking water resources. There is Leachate water from the waste to the bed of Agva

Findings by observation (P.S.: Necessary pictures in the original are excluded in this text)

Observations in the waste sites found that there are diametrical differences between the stated objectives in the projects and waste management activities and operations.

Finike waste disposal site: The 1995 observation findings in the site is as follows: The site is seen by the people driving along the highway and the first thing strikes the observer is the environmental pollution in the area. The road to the site is full of waste dispersed all over the area. Recyclable waste is separated by 10-15 years old children by hand. Empty plastic bags are everywhere. There is no preventive measures on anything. Grazing animals also is the part of the waste site landscape

Agva disposal site: Following findings were obtained during the 1995 observation:

- As stated in the project, waste had been unsystematically disposed all over the site.
- As stated in the project, recyclable waste were being collected by peasants by hand employed by a private company.
- Peasant workers were living in the waste site.

- There is no monitoring, evaluation and prevention of ground water contamination.

During the 1996 observation of the site resulted in following findings contradicting the stated objectives of closure and post-closure care:

- Some people are still living in the closed waste disposal site.
- Site surface is not properly closed beyond merely covering with soil.
- Site visually disturbing.
- Surface of the site is covered with waste, especially with plastic bags.
- There is no indication of post-closure landscape arrangement and maintenance in the site.

Ulupınar waste disposal site: During the August 1996 observation, various environmental effects of the waste site development and daily operations were found. These findings are mostly diametrically different than statements in the project. Findings are as follows:

Trees were uprooted in order to open field for waste disposal.

There is no preventive measures for the foul smell. in the site. The air quality is altered by heavy smell. Deterioration of air quality reaches outside the site.

According to Beycik village residents, unbearable smell reaches them especially during the summer time.

Nearby villagers bring their animals to the site for food.

There is no barriers to stop animals to get in the site.

There is no sign in the site to indicate that there is separation of waste materials and recycling.

There is no sign of daily covering: Waste is left in the ditches or on the ground (Figure xx)

A significant amount of waste covers the surface of the areas filled up and closed with soil .

Birds continuously feeding in garbage is observed; The probability is high that the site with garbage all over is a feeding ground for the other wild life.

There are garbage in plastic bags and in open along the dirt road to the site.

Pruning waste spread around.

Some petroleum products are seen spilled on the site ground, along with the can.

Some hospital waste is seen spread around.

Significant amount of grass waste was thrown together making a small hill. Grass hill is full of durable goods waste, metal and aluminium cans, shoes, clothes parts, and plastic products.

Following environmental results which were found by the studies elsewhere (The U. S. National Park Services, 1994) are also expected because of the nature of waste management operations in the sites: Altered, and destroyed vegetation ; Altered, fragmented and destroyed in habitat; Barriers to wildlife movement created; Collisions or road kill on wildlife increased; Corridors for exotic species invasion created; Exotic/ alien species directly introduced; Diseases introduced; Life cycles of wildlife disrupted; Nutrient flow/ food chains altered; Nonnatural foods or habitat introduced; Nontarget species destroyed.

In short, the landfill management method is simply dumping the waste and when it reached to certain amount, it was covered by the soil. There was no indication of daily cover over the waste; no indication of any measures stated in the project are applied. It is far below a modern and sanitary waste management practices. Thus, finding shows that there is a tremendous incompatibility between stated waste management methods and the waste management operations.

The management's own evaluation

According to Two interviews conducted in two different times, it was found that the GATABI ALTAŞ administration sees no problem at all in their operation, except a lawsuit by a nearby town. Observation in the town indicated that their waste was not being collected by ALTAŞ, probably as a counter-measure against the town's lawsuit.

Interviews about the waste management and environmental conditions in the Ulupınar site resulted in different findings than the site observation. The interview findings are presented in Table 1.

Table 1. Evaluation of the waste management issues by ALTAŞ management

Management issues	Current Management
Waste method used	Landfill
Kind of waste disposed off	Garbage trucks dumps them; workers separate the recyclable (papers and bottles); the rest is disposed off.
The method of disposal	Garbage is covered by soil daily.
Waste separation	It is being done.
Who separates	The contracting company
The place of separation	Waste disposal site
Open air garbage burning	None. The medical waste is sent to Mediterranean University incineration facility.
Any measure on the impact on wildlife	No measures taken

Power and control in environmental management: There is no control, monitoring or auditing of any kind related with the operation of the waste disposal site. ALTAŞ doesn't see any need for control in daily routine, because everyone does their job.

Technology used: The same motorized vehicle is used for digging the soil, pushing the garbage and covering the waste. No other technological means (i.e. leachate treatment system; gas recovery system; groundwater monitoring system; leachate collection system; liner) are utilized for waste management and environmental Protection.

CONCLUSIONS AND DISCUSSIONS

Based on the information\data and findings, qualitative evaluations were made and it is found that (a) the waste management system is based on unsanitary landfill practices, (b) The landfill sites are polluted by the waste and (c) there may be potential dangers not only to the immediate environment, but also to the nearby communities, especially to human health, flora, fauna and soil.

Waste management system and its implementation: Findings based on interviews and projects don't reflect the realities of actual operation. This finding also has a very serious implications for the researchers: The research findings indicates that both construction and post-construction responsibilities were not and are not carried out and in contradiction with the stated objectives of the GATAP plan. The closed Agva site is in urgent need for post-closure care. It is extremely meaningless to talk about the environmentally sound waste management policies, if there is no adherence to stated objectives by the policy makers and operators.

Technology: Environmental protection via waste management also requires the selection and utilization of proper technologies. To do so, it is necessary to investigate the environmental impact history of the technologies.

Laws: As Curia (1991) indicated, the waste control regulation has some serious shortcomings. The most important of them are:

1. No information is given about the operation of waste disposal site; For instance, there is provided no fundamental knowledge about how to cover the waste surface.
2. No information is provided about machines required for job accomplishment in the waste sites.
3. whether recycling will be done in waste disposal sites; if it will, what kind of method will be used is not clarified.

EIS reports: The EIS reports, according the findings, proved to be meaningless in terms of daily activities. As Biswas indicated (1994):

1. EIA reports by themselves are not enough. EIA methodologies should incorporate requirement for climatic, social and cultural characteristics. Methodologies that are currently available for EIA are generally not appropriate for developing countries. National and international organizations should work together to develop operational EIA methodologies.

2. UNEP International Society for Ecological Modeling collaborate together to prepare a handbook on good EIA case studies from developing countries in the field of air, water and solid wastes.
3. Monitoring and follow-up work is required to see how the forecasts made by the initial EIA studies compare with the actual impacts after the implementation of the project
4. Risk analysis and social impact analysis should be integrated within the framework of EIA methodologies
5. Public participation is an important requirement for EIA reports.
6. Education and training in EIA are essential for all developing countries.

Safer Environmental policy: The Project evaluation doesn't exist 'beyond project itself. Collection and analysis of baseline data during the preparatory phase of the project is vital for subsequent evaluation, but the data and findings and proposed management options are geared toward only regulatory and bureaucratic justification. Safer disposal for solid waste regulations should establish a cost-effective and practical system for managing the nation's waste by, as the U.S. Environmental Protection Agency put forward (EPA, 1994 and 1991): Encouraging source reduction and recycling to maximize landfill life ; Specifying safe design and management practices that will prevent releases of contaminants into ground water; Specifying operating practices that will protect human health; Protecting future generations by requiring careful closure procedures, including monitoring of landfill conditions and the effects of landfills on the surrounding environment; The regulations also should state what measures must be taken to guard against and clean up ground-water contamination and describe the kinds of areas where landfills may not be built. Thus, it is necessary to bring regulations on location restrictions, operation criteria, design criteria, ground water monitoring, corrective action, closure and post closure care. The findings of the research indicates complete non-existence of such criteria. No criteria related with excluding hazardous waste, daily cover, disease vector control, explosive gases, air pollution, access control, surface water management, liquid management can be found in effect in the daily operation of the waste sites. There are no regulations on such criteria made clear and enforced.

Limits of the environmental acts: The environmental protection acts are necessary, but not sufficient. Because problem is not rooted in the lack of legal provisions, but in the prevailing social, economical and cultural practices. Thus, Environmental acts and regulations, Environmental Impact Assessment Reports and projects paying attention to environment are not functioning as expected; Monitoring and periodical auditing by independent agencies should be in effect to evaluate the operation and its impact on environment in order to ensure that stated objectives and environmental conditions are met during the site development and daily operations. Otherwise, Environmental Impact Statements\Reports and lofty projects merely function as means of meeting the burokratik requirements on paper.

Monitoring and auditing: There exist no monitoring in the waste disposal sites and a monitoring system should be established. Monitoring is an important prerequisite for keeping track of changes in waste quantity and quality and their impact on health and environment. Standard setting and monitoring are key elements essential for gaining control over waste-related pollution by formulating scientific guidelines for the environmentally sound solid waste management. Training programs for waste-related pollution monitoring and enforcement should also be developed. Pollution control agencies should establish and must have the necessary legal mandate and resources to effectively carry out their duties (Agenda 21, 1992).

Self-control and evaluation is not an acceptable and reliable method of control for environmental Protection. Control should be done by an independent agency, if not a state agency. Since findings indicate that waste management in the landfill sites are environmentally insensitive and irresponsible, it is futile to suggests, i.e., monitoring and environmental auditing in order to enhance the management practices. Since there is no control mechanisms, the nature and extent of control, monitoring or auditing issues lose their meaning.

Some serious corrective measures in the landfill sites are required, but not sufficient. Sanitary landfill system with continuous monitoring and periodic auditing and environmental impact assessment is necessary.

Environmental auditing in the projects is virtually nonexistent. environmental auditing is a must as a systematic process of determining whether the interventions of the

projects are in compliance with regularly requirements and with the National policies and standarts for environmental management. Auditing is a methodical examination involving analyses, tests and confirmation of the procedures and practices in the project area. It is to assure the authorities and the public that all measures have been taken to protect the environment, the public and the project staff against all short-term and long-term hazards. Environmental auditing could well be the only tool to help identify critical factors such as (Thanh and Tam, 1994):

- 1- lack of awareness and/or understanding of environmental regulations;
2. Inadequately designed, poorly maintained and protected facilities and equipment.
3. the lack of authority and responsibility delineation in environmental matters; and
4. external forces(such as earthquake, floods, fires, sabotage..) which may affect the project integrity.

Behaviors and attitudes: As Kocasoy (1995) indicates that it is a negative implementation of the decision makers often apply to construct the solid waste sites in forest areas in order to keep the waste polluting the environment out of sight. The forest is polluted by waste and soil surface is deteriorated. Ulupınar, Finike and Agva disposal sites are prime examples for such usage. Disposing the waste out of sight and thus out of mind is a self-defeating and self-deceiving practice, because the problems remain and adds up. Instead, the problem should be faced and a sound system of waste prevention and management policy should be implemented. Such system and management require conscious participation by state regulators, environmental organizations, native people, tourists and operators of waste management system. Regarding Landfilling, If those who run the day to day operations do their share, the landfill facility can be operated in a more environmentally sound manner.

Current waste management, findings suggests, doesn't reflect the GATAP project's objectives. What urgently needed is a change in the way of prevailing business culture, thus changes in the nature of management decisions are made and the way of management practices are carried out. Such change can not be easily achieved, because it requires a change in dominant cultural practices in business and politics.

Only then, the landfill facility can be operated and maintained at the same higher level as was designed and constructed. continuing the use of sustainable design concepts.

Planning of a facility normally affects its operation and maintenance; In the observed landfill sites such causal relationship doesn't exist at all. Thus, the problem is not with the the planning and design, but with the lack of intention to adhere the design in constructing the site, buying and utilizing the appropriate technology and daily operation.

Plans, projects, laws and regulations are not enough and further more doomed to remain inactive and meaningless, unless there exists a culture (ways of doing things) rooted in environmental sensitivity and responsibility. The research findings indicate that there is a serious lack of such culture in waste management.

Community relations and participation: Findings also indicate that there is no productive interrelations and communications between GATABIALTAŞ and nearby communities. Productive communication can not be expected under the current conditions. People living close to Landfill sites shouldn't be left out. They should be part of the project and operation at every stage. Their participation in decision making, problem identification and problem solving should be considered as a necessary requirements for waste management. Unfortunately, people nearby the sites are ignored; Environmental organizations are excluded; State institutions related with the environment has completely left the management to private enterprise and established no control mechanisms and procedures in terms of ensuring that integrity of environment and human health is not in danger.

Education, awareness, commitment and self-interest: Findings on the discrepancy between the GATAP project and actual operations indicates that existing environmentally unacceptable disposal system was designed and run so, not because the management has little idea of how the system operates, where the waste goes and what are the final outcomes.

Current conditions can not be tied to "education" because those who are responsible are well educated and well aware of environmental consequences. Thus, the issue

seems not question of education or environmental awareness, but question of bad economics that brings high returns on short term for some and high environmental and health burdens for all. Creating and enhancing values supporting sustainable behavior towards environment are mitigated by the self-interests of those in management. Under such waste management practices, staffing, staff training and interpretive efforts for environmental sensitivity and maintenance lose their meaning, because first and foremost problem is nonexistent commitment to good environmental practices by the policy and decision makers.

Cost-benefit calculations: Solid waste management research and projects should overcome the one dimensional waste management method. Project researches give the impression that economical cost and social benefit calculations are done to prove the use of landfill and giving up the other alternatives. Alternative methods should be developed and market for the alternative systems should be build and encouraged.

Environmental solutions shouldn't be confined within the sanitary landfill system. Modern landfill is not the answer, because it is not a permanent solution: It only postpones the problem for 30-40 years. Thus, establishment of an integrated waste management system is imperative: The best strategy to reverse the trend in environmental conditions and to reduce the effect on human health is to address the root causes by engaging in activities to change the dominant patterns of production, distribution and consumption that generate waste. To accomplish such an objective, primary focus should be on waste prevention, waste minimization and reuse at every level of social production and production relations.

Antalya region is not an independent entity, but integrated part of Turkey occupying a certain place in the world order. From Our Common World to Agenda 21 and beyond, irrefutable evidence increasingly has demonstrated that there is an intricate interdependence between the world's economy and the world's ecology. Poverty, industrial development, depletion of natural resources, destruction of environment and human health are all closely related issues. Solutions to any of these issues can not be individually achieved, taken isolated and in vacuum.

Environmental problems and solutions in Antalya region or elsewhere are intimately tied to the system of production of goods and services (the economic system and the

way it operates). It is a global problem and every individual, family, school, business and socio-cultural organizations have responsibility to take part in protecting the integrity of environment.

Further research is needed to evaluate the environmental and human conditions in the processes of waste production and management. Moreover, it seem necessary to look into effective system of monitoring, auditing, etc.

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