Negative consequences of pollution

Externalities are known as the third party effects evolving from the production and consumption of goods and services in which the third party does not receive any appropriate consumption. Externalities are the root to market failure if the pricing system does not consider the social costs and benefits of production and consumption. The provision of the incorrect quantity of goods and services to customers by the market mechanism sources a deficit in social welfare in an effective working market society ought to disperse property rights. If no individual is the owner of a specific good then nobody has an economic incentive to safeguard that good from being harmed. This is directed towards the " tragedy of commons" where, for instance no particular person owns the ocean or the fish in the ocean therefore the deficiency of the population of living fish is annihilated by the fishing industry. Resulting from the absence of clearly defined property rights, markets are unable to completely account for them, assigning prices of goods and services. Studying a scenario that lacks government intrusion, as no one owns the air, polluting industries do not raise their prices to recompense for correcting their pollution because they fail to undo air pollution and this will ultimately result in health difficulties among third parties and these third parties ought to then pay for the rectification of their health. According to the World Health Organizations three million people are killed around the world and this is attributed to outdoor air pollution (annually) by motor vehicles and industrial emissions and 1. 6 million indoors from the usage of solid fuels. There exists a range of studies that estimate that 7-20% of all cancers are caused by air pollution (only). Waterborne diseases are accountable for 80% of infirmity and deaths in developing nations, claiming a child's life in every eight seconds. Contaminated water is

the sole cause of the deaths of 2. 1 million humans who fall victim to diseases that are linked to contaminated water sources. Contaminated land is a severe problem in developed nations as industries and power stations dispose of heavy metals in the soil. One shocking feature of agriculture is its potential to poison land with pesticides, nitrate-rich fertilizers and faeces from cattle and this is coupled with the fact that contamination that reaches rivers harm various life-forms.

To the economist the problem that arises from externalities is not that the activity occurs, but that a surplus of it occurs. To locate the market outcome we begin by using supply and demand. The market price and quantity are represented by Pmkt and Qmkt in figure 1 below

However, the market outcome is not the efficient result. The supply curve illustrates only the private costs of production, mainly the costs occurred by those firms producing the good. Costs are inflicted on innocent bystanders due to negative externalities therefore it does not symbolize all costs. Therefore we draw another curve the " social cost" or SC curve. This diagram signifies all costs of the product including private production costs and external costs. The efficient level of outcome occurs where the demand curve and SC curve intersect which is depicted by P* and Q*. Qmkt > Q* meaning that the market produces greater levels of amounts of this good than the efficient amount, this phenomenon is known as " over production". Another notification of Pmkt < P* means that the market price is less than the efficient price. Reason being that the market outcome is so inefficient is due to the fact that the private market leads suppliers to produce some units of the good (between Q* and Qmkt) whose cost of production exceeds their

value to consumers. It is believed that this is true because the units of the good between Q* and Qmkt, the demand curve (measuring value to consumers) is below the SC curve (measuring all costs). The overproduction of goods with negative externalities transpires because the price of the good that the buyer does not fully cover all of the costs of producing or consuming the good. If all costs were taken into consideration, then prices of these goods would be superior and people would utilize of them. If the costs of the negative externalities, the harm from pollution were put on the good as a tax, then people would become conscious of the full cost of producing and consuming that good and the efficient amount would be the smaller amount demanded. From the above graph we can come to the conclusion about all market allocations of commodities causing pollution externalities. ie. the output of the commodity is too large, too much pollution is produced, the prices of products responsible for pollution are too low, as long as the costs are external, no incentives to search for ways to yield less pollution per unit of output are introduced by the market and recycling and reuse of the polluting substances are discouraged since release into the environment is so inefficiently cheap.

A property right is the restricted authority to resolve how a specific resource is used whether a resource is owned by government or individuals (Alchian, 2008). Property rights must clearly be defined, their use must be scrutinized and possession of rights enforced (Alchian, 2008). Transaction costs are the costs of defining, monitoring and enforcing these rights (Alchian, 2008). There are four different types of property rights mainly open access, common property and private property (Pearce, 1989). Open-access

property does not have an owner, is non-excludable, that is no one can prohibit another individual from making use of it, and is non-rival, the use of the property by one individual will not restrict of prevent its use at the same time by another individual. Open- access property unsupervised and access to it is not restricted. The existence of open-access property arose from the fact that the ownership of the property has never been established, either because the state has legislated it, because no efficient controls are in place, or it is not considered feasible because the cost of exclusion overshadows the benefits. Open-access property can be converted by the state into private, common or state property through legislature, clearly defining rights and enforcing them. Examples of open-access resources which the state may convert include the atmosphere and ocean fisheries. State property, is owned by everyone however, access to the property and the use of it is controlled by the state, example a national park. Common property is controlled by a group of individuals, who are responsible for access to, use of and exclusion from the property. Private property grant strict control to the owner, who has control over the use, management and access of property, the owners may prevent another individual, if they want to, from using the property, and they can also restrict the simultaneous use of the property.

The polluter-pays-principle and victim-pays- principle is dependant on the provision of property rights for environmental goods. The costs of pollution are to be borne out of those who instigated it stated by the polluter-pays-principle. Its goal is to determine how the costs of pollution prevention and control must be assigned: the polluter must pay. Its objective is the internalization of environmental externalities of economic activities so prices

of goods and services completely depict the costs of production. Bugge (1996) acknowledged four types of ppp; economically, it promotes efficiency; legally it promotes justice; it promotes harmonization of international environmental policies; as well as it defines how to allocate costs within a state.

The ownership of environmental goods rights are undefined and by default it is the polluters that are usually favoured. If no appropriate bylaws are put in place to ban polluting activities and property rights are indeterminate, polluters will implicitly have the upper hand. As these polluting activities are aggravated and society's welfare becomes more pretentious, the victims of these activities will band together to maintain their right to a protected environment. This will eventually lead to regulation being put into practice which will shift property rights towards victims until equilibrium ie. between optimal pollution and optimal pollution abatement is reached. This equilibrium is shown by the intersection between the marginal abatement cost and the marginal damage cost schedules, . Coase illustrates this result by using the example of a farmer cultivating his land and another who breeds cattle that needs that needs land to graze on. Both individuals have adjoining land which is not enclosed. There are two possible consequences depending on how property rights are allocated; case1, the law is in favour of the farmer breeding cattle. Nothing prevents the cattle from grazing on the other land. The latter will have an incentive to bargain with the farmer and try to get him to reduce the damage done to his crops by reducing the herd. Case 2; the law is in favour of the farmer with crops. The farmer with the cattle is responsible for the damage his herd causes to others crops and

must pay for these damages. It is in his interest to negotiate to try and reduce his costs. The effectiveness of this bargaining process rests on assumptions regarding the economic definition of environmental property rights. Tietenberg (1992) states that the structure of the property rights is characterized as follows: universitality, all existing resources are allocated; exclusivity, all costs and benefits from the possession or use of resources are attributed to the holders of the rights either directly or indirectly; transferability, all rights are transferable through voluntary exchange between agents; protection, property rights are protected from voluntary or expropriation.

According to the coase theorem everyone has perfect information, consumers and producers are price-takers, there is a costless court system for establishing, producers maximize profits and consumers maximize utility, there are no income and wealth effects as well as no transaction costs. The initial allocation of property rights does not matter for efficiency but if any of the conditions do not hold then the initial assignments of property rights matter.

When property rights are apportioned to polluters, the victims of pollution will be enthused to bargain. If the victims are in possession of the property rights then polluters will instigate negotiation. Optimal pollution and optimal abatement must be taken into consideration to determine the situation where rights are optimally allocated.

Figure 2

The above diagram depicts the process. The vertical axis illustrates the level of costs involved and the horizontal axis depicts the level of reduction in pollution. MDC is the marginal external costs and the MDC illustrates the level of reduction in pollution. The equilibrium is determined at Z* where MRC intersects the MDC curve. The polluting firms will produce its maximum level of output when there is no reduction in pollution. In contrast the level of production will be the lowest when there is a complete reduction in pollution. This figure can be linked up back to the preceding cases in respect to the establishment of property rights. At Z0 the level of pollution is maximized hence there is no reduction in pollution. This implies that that both the polluter and the victims are given the rights. At the reduction in pollution is at its maximum hence the rights are given to victims.

When the polluters activity influence the welfare of a sufferer an external cost is generated and the sufferer should be compensated. Ronald Coase (1960) pointed out that sufferers and polluters are incorporated in negotiating incentives of an efficient level of unfavorable impacts regarding of the assignment of rights when the transaction cost is negligible.

The illustration above portrays the output level a firm will operate at (QÏ€), where profits are maximized, however the social optimum is at Q*. When the sufferer has the property rights, the polluter does not have the right to pollute and the sufferer has the right not to be polluted. The sufferer chooses not to have any pollution at the starting point and at the origin the two parties begin to bargain. If they moved to d, the polluter would obtain Oabd in profit and the sufferer would lose Ocd. There is a chance that bargaining could occur as OABD is greater than OCD. The polluter will make a

proposition of compensation to the sufferer since Oabd is greater than Ocd and less than Oabd. If this bargain happens, there is a movement to d which is known as a Pareto optimal allocation as one party is better off, (sufferer lost Ocd but gained more in compensation) and no party is worse off (polluter still has net profit). A move to the right of Q^* is not plausible because polluters gains are less than the victim's losses. Therefore the polluting firm won't compensate the sufferer to move beyond Q^*. Now if the property rights are assigned to the polluter, start at QÏ€ because it's the point at which the polluter can take advantage of his right to use the environment to dispose of his waste products. It is again possible for the two parties to bargain and move from QÏ€ back to f. Here the sufferer can compensate the polluter to give up a certain amount of economic activity or output level. The sufferer is willing to tolerate a loss fhi QÏ€ if the move does not take place and will offer an amount less than this to get the polluter to cut back pollution. The polluter is prepared to accept an amount greater than fgQÏ€. i. e. the profits will be relinquished as long as there is a probability of bargaining between the polluter and sufferer the market will take us to the social optimum ie Q.

The commons can be referred to as a society composed of the population. According to Hardin the idea that everyone born with equivalent rights to the commons in sharing resources, concurrently with overpopulation will destroy the commons, therefore tragedy of the commons. Overpopulation and pollution are the contributing factors that facilitate the commons not being sustainable.

The South African population was 40. 6 million in 1996 and is persistently growing at 2 percent per year. A continuation of this trend by the year 2035 will result in 82 million of the inhabitants relying on an equivalent level of natural resources which are already under strain in sufficiently meeting its demands, therefore escalating the production of pollution and waste. The burdens of overpopulation on natural resources uniting with cooperate greed leads to detrimental consequences.

A case in point is one of the " Toxic water rising below Johannesburg". Twenty miles North West of Johannesburg, the water from the spring runs blood red. It is toxic, highly acidic and bursting with heavy metals, so foul those animals in the Kruderdorp Game reserve downstream say no to drinking the water causing them to die of thirst therefore not one living organism is able to endure this venomous water. Millions of gallons of this toxic water lie beneath Johannesburg, a municipality with a population of nearly four million citizens. The water is rises at fifty feet a month. If this persists, in roughly two years time subterranean parking garages will be filled up with this deadly red water. Tunnels for electrical cables and underground railway stations will overflow. Unnatural crimson water pours out from the ground leading into the suburbs and eventually fleeing into the east of Johannesburg. Due to Johannesburg's gold rush, mining companies extort enormous holes under its city and suburbs. When it rains much is soaked up in the earth and the water becomes toxic when combined with heavy metals underground. Terry McCarthy, a geology professor of the university Witwatersrand warn that existing mining operations in other parts of South Africa were on their part to destruction and it would eventually

poison some of Johannesburg's main drinking water resources, causing future generations to be imposed with greater costs of the Vaal Dam and Vaal river.

The tragedy of the commons relates to almost every commonly held property. Individuals and firms accept a hundred percent of the gains of easy disposal of waste into air or water but only sustain a fraction of these negative impacts of pollution. It is therefore necessary for government to control pollution, providing incentives to prevent pollution or inflicting penalties should pollution occur. Another example is that of national parks where the parks can be accessed by everyone without limits to visitation. As the number of visits multiply degradation of parks become more plausible. The finite number of parks combined with increasing visitation and population growth makes conservation efforts difficult.

In order to avoid the tragedy of the commons population control is a need. Hardin proposes that laws, legislators, beuros and watchers who watch the beuros to legislate and enforce laws are the key elements of controlling the population in the commons. He also emphasize that conscience and sense of guilt are not enough to restrict the population. People can freely make choices between the options offered by the laws, but are compelled to choose the options that brings themselves under control. Reason being if they choose the unrestrained option they will have to pay more prices or run more risks of losing something valuable. For example people believe that if the accept compulsory taxes because they understand voluntary taxes would favor the conscienceless people who don't pay taxes at all. Hardin

ends with establishing that education can put an end to the tragedy of the commons.

There are numerous reasons as to why a coasian solution may not work; ie. transaction costs, state of competition, the free- rider problem, identifying polluters and victims and people unwilling to trade transaction cost include information and measurement costs, negotiation costs, contracting (legal costs) and monitoring and enforcing costs. The cost of setting up the contract between polluter and victim becomes excessive because of the countless polluters and sufferers. The many questions become controversial including who is suffering, whose polluting and by how much? How much will resolve the bribe or payment and will defer among individuals. A coasian solution works well when there is perfect competition, on the contrary it is feasible to get such a solution under imperfect competition but the analysis is much more complex. Due to environmental goods being classed as public goods, the free- rider problem poses a dilemma as the provision of public goods would not be sufficient if left to the private sector. Since convincing everyone to play a part in diminishing incentives to cheating on agreements remain intricate. Predicted by the game theory models, bargaining would make vulnerable. If there are clearly defined property rights and contracts are drawn up then those rights that are allocated to may be unwillingly to trade.

Some government intervention is needed in environmental conflicts by inflicting either liability or property rules. Property rules stipulate the allocation of the entitlement. Example entitlements include the right to pollute the air or on the other hand, the right to fresh, clean air. When

applying the property rules the court decides on which right is paramount and places an injunction against the infringement of that right.

The Coase Theorem involves establishing property rights as a means to solve the creation of externalities. This essay has been based on the negative externalities of pollution, the formation of property rights, bargaining in addition to a critique of the " tragedy of the commons". It has been found that although there are no government interventions in a free market economy, courts are still required to intervene in the establishment of the property rights. Furthermore it has included a discussion on the main consequences of over pollution and ways in which government could solve this problem. It went on to give reasoning as to why the coasian solutions may be falsified which was illustrated by examples throughout the essay.