

Theories and Interpretations of Environmental Policy

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In this essay I will explore the Natural capital and Environmental economics interpretations of environmental policy. I will seek to define the similarities and differences between the two approaches and explore their practical application. Finally I will assess the extent to which the theories are applicable to current environmental policies. I intend to do this by establishing criteria based on the key components of the two interpretations. Natural capital is the finite stock of natural resources, such as land, water, minerals, which are used for production. The Natural Capital approach states that sustainability is only achievable if the level of natural capital stock is maintained at or above the current levels (Constanza et al (1997)). The production of human capital and ultimately human welfare, depend on natural capital to yield the flow of eco-system goods. Pearce (2002) notes the 'strong' version of the Natural Capital approach posits that natural capital has a distinct contribution from other kinds of capital. It therefore assumes that it is not possible to substitute one form of capital such as economic capital for natural capital. Pearce (2002) notes that Natural Capital theory goes further and indicates that manufactured capital generally requires natural capital for its production, and that the man made economy must be viewed as a subsystem of the larger ecological system. There have been attempts to value natural capital and eco-system services to demonstrate the intrinsic value of eco-systems in relation to the economy and human welfare. Constanza et al (1997) seeks to demonstrate that because the value of eco-system services are not fully captured in commercial markets, which results in a lack of priority being given to the issue of natural capital stocks in policy making.

Pearce (2002) explores the history of Environmental Economics which draws upon basic economic principles. In particular Environmental Economics theory argues, along cost benefit principles, that natural resources and eco-systems may be depleted in the pursuit of economic development. With every cost there are externalities, in this case waste, leading to degradation as well as a depletion of natural resources and ecosystems. The theory draws upon the Pareto criterion that if accurate compensation is made to the 'loser' an overall optimal position can be achieved. The overall principle is that it is possible to achieve optimal growth through an efficient economic system that accurately takes into account the contribution of environmental eco systems. Pearce (2002) highlights the principle that environmental problems have their roots in the failure of the economic system to maximise human well being. Environmental economics seeks to ensure that eco-systems are valued as important contributors to overall human well being as well as economic growth objectives. Pearce (2002) concludes that maximizing overall benefits through optimal economic use of natural resources is not sustainable because of the multifunctional contribution of eco-systems. The expectation of technological advances and progress is therefore a necessary part of ensuring the environmental economics approach is sustainable.

Both Natural Capital theory and Environmental Economics seek to demonstrate and estimate the value of ecosystem services generated from natural capital. Natural Capital theory suggests that the contributions of eco-systems to overall human life dwarfs man-made capital and therefore the impacts on eco-systems are consistently undervalued in policy making terms. Constanza et al (1997) argue that our policy making decisions imply valuations in themselves because we are choosing to pursue policies that protect or damage eco-systems in relation to other elements such as the economy. The methods Natural Capital theorists use for valuation are based on models of the 'willingness to pay' of individuals for ecosystem services. As Constanza et al (1997) note, this provides the estimated total value of ecological services regardless of whether they are currently marketed. Part of the reason Natural Capital theorists believe ecosystems are undervalued is because a large part of the contributions made by them pass directly to society without passing through financial markets. Constanza et al (1997) conclude that if ecosystem services were

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fully paid for, the balance of the global economy would be entirely different. Environmental Economics also seeks to place a value on ecosystems in order to rebalance the market failure that results in negative externalities (the effects of pollution). Valuation in Environmental Economics often seeks to place a monetary value on eco-system services in order to internalize the effects of pollution within a cost-benefit analysis. Valuation in monetary terms is also useful for comparing ecosystems costs and benefits with other economic costs and benefits within the process of environmental impact assessment (Pearce (2002)). Another common theme between the two approaches is the acceptance that the current stock of natural capital is finite and that thresholds exist at which point the damage will have an effect on the economic system. According to Pearce (2002) both approaches can be referenced to ideas in Boulding's 1966 essay referring to 'spaceship Earth' which describes the Earth as an object with physical limits. Natural Capital theorists such as Daly (1991), focus on preserving the limited supply of resources while Environmental Economists see that unbalanced economic activity may result in permanent damage to limit resources which would then impact on economic systems. Both theories are concerned with how to manage the limited natural resources of the planet.

One of the key differences between the two approaches concerns the value of eco-system services. Natural Capital theory considers human and natural capital as complementary to each other. For Natural Capital theorists, sustainable economic activity is requires contribution from both human capital and natural capital. Rees (2003) draws upon the view of the ecologist Daly (1991) who argues that that the economy should be viewed as a subset within the context of a wider ecological picture. Environmental economists do not have such a fixed view of the relationship between the different types of capital. Instead they see the possibility that natural capital may be substitutable. Environmental Economics points to the development of better extraction methods and the discovery of alternative resources which have extended the lifespan of certain finite resources. It is interesting to note that the focus of natural theorists has been firmly on the finite nature of resources and the effects of scarcity whereas environmental economics seems to embrace the possibility that human progress and development may lead to technological impacts that will lead to more efficient use of natural resources to the benefit of human welfare. Part of this difference is that Natural Capital theorists consider environment problems as more pressing, with a focus on the thresholds and impending limits of natural capital. Another major difference is that Natural Capital theory has a preference for environmental policies that are more certain in their effects (Alberti and Marszluff (2004)). The belief that natural capital stocks are close to crucial thresholds contribute to this as well as the principle that small changes in the man-made economy can result in major effects for the environment. The command and control policies have been the fundamentals of traditional environmental policy. Pearce (2002) illustrates the most obvious example is the technology-based environmental standard that works by telling the polluter what technology to use either in production of the good he is producing or in terms of abatement equipment. Environmental Economics will also make use of market based policies such as incentives and disincentives to influence behaviour.

There are a number of practical applications of these theoretical approaches. Natural Capital approaches focus on the limited provision of natural resources and the delicate balance of eco-systems in the ever expanding human development paradigm. Alberti and Marzluff (2004) explore the relationship between human and eco-system functions. They conclude that there is a unique pattern of behaviour between integrated socio-economic and ecological systems. Alberti (2003) highlights cities as prime examples of this emergent socio-economic phenomenon. The expansion of cities through 'urban sprawl' is an area where natural capital theories are relevant. Alberti and Marzluff (2004) describe urban sprawl as an unsteady state based on importing eco-system services from other areas and which relies on incomplete information about the full ecological costs of providing human services in these areas. The compact city model is a policy which seeks to reduce the negative impact of economic growth in cities and limit the amount of low density development around the outskirts of the city, while promoting multifunctional land use. The model is often introduced under the banner of sustainable development because its outcomes can include economic benefits as well as reducing climate change and the impact on local ecosystems. Encouraging multifunctional land use has strong links to the natural capital tradition with the emphasis on making the most efficient use of the ecological resources. In addition there is recognition of mankind's responsibility to make efficient use of resources and not be unnecessarily wasteful by pursuing urban sprawl approaches which underutilize the land as well as create extra requirements for human interventions e.g. (transport links, energy supply).

The Environmental Economics approach has been concerned with the use of market based instruments to policy

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making. Examples include pollution taxes, deposit-refund schemes, and tradable pollution or resource permits. Pearce (2002) notes that environmental taxes are prevalent in OECD countries. He states that: "the virtues of these approaches lie in the theoretical expectation that they will (a) minimize the costs of complying with regulations, and (b) stimulate technological change because the tax (or need to buy permits) is avoided if pollution is reduced" (73). Environmental taxation is steeped in the tradition of environmental economics. The efforts to monetize environmental effects, and tax those that pollute accordingly, are consistent with the principles of identifying and valuing the impact of the economy on the environment. Recent developments have also illustrated the environmental economics principle that the market can generate positive impacts for sustainable development through mechanisms that result in both ecological benefits and support economic growth. The double dividend effect is that a tax on pollution yields revenues that can be used to reduce taxes in other areas of the economy (Pearce (2002)). The tax therefore can secure both ecological objectives, the reduction in pollution, and also economic objectives such as the reduction in another tax.

I will now critically examine the two approaches in terms of their application to policy tools in order to evaluate how these policies may assist in assessing environmental impacts. In order to understand how applicable each of the approaches is to policy I have created a selection of criteria to assess certain policies against in order to determine how applicable the Natural Capital approach and the Environmental economics approach is to each of them. The criteria can be summarised as follows:

1. Distinction of natural capital from other types of capital
2. Use of market based incentives/disincentives
3. Emphasis on protection natural resources
4. Does the policy seek to determine all of the internal and external costs- Contanza (1999)
5. Does the policy encourage adaptative improvement- Constanza (1999)

The criterion is based upon the key components of the two theoretical approaches and my aim is to establish how applicable these two approaches are to the policies I am examining. I will assess the environmental policies of Environmental taxation (Pearce (2002), Leiserowitz, Kates and Parris (2005)) and "Compact Cities" (Wegener (2004)). The full results of my analysis are attached in the appendix following this essay. Following my examination of the environmental policies (see appendix) I have identified the following conclusions. Environmental taxation is firmly influenced by the environmental economics approach. Environmental Economics accepts that environment, social and economics goods may in certain circumstances be substitutable with each other. The policy of an environmental tax imposes a cost upon polluters and the environmental costs are compensated for through economic costs to the polluter. Environmental Economics seeks to use market based initiatives to deliver behavioral change and with environmental taxes the market disincentive to pollute is higher taxes. This policy does not emphasis the limited amount of natural resources that exist. The use of limits and restrictions on the amounts of pollution would ensure that key threshold levels of natural resources and eco-systems quality were maintained however Natural Capital theorists would argue these levels would need to be set very low as environmental impacts are always understated because of the lack of full information. In terms of accounting for all internal and external costs and benefits Taxation policies mean that polluters pay tax on all pollution regardless of whether it is optimal or non-optimal. Environmental Economics encourages the possibility that economic development will lead to technological advances that will help address environmental impacts and this policy is one way of doing this. Taxation policies are likely to encourage technological development as firms seek to find ways of avoiding paying the tax by reducing their pollution. In conclusion Environmental Economics principles are fundamental the policy of Environmental taxation. The overall principle seeks to place market principles at the heart of addressing environmental impacts and seeks to off set negative environmental impacts through compensation and reduce pollution through financial disincentives and encouraging technological advancement.

I analysed the "Compact Cities" policies against the same criteria to assess how applicable Natural Capital and Environmental economics approaches were to them. My conclusions placed "Compact Cities" within the Natural capital approach. The key tenet of the Natural Capital approach is that natural capital is a unique and finite resource and is not comparable in valuation terms with social or economic capital. The "Compact Cities" policy as outlined in Dieleman and Wegener (2004) is to restrict urban sprawl through what are known as command and control polices.

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This policy recognises the limitations of natural capital by restricting mankind's impact through land-use policies and encouraging ways to maximise existing use of land. In contrast to using market based incentives and disincentives this policy ensures that the type of building that occurs outside of city limits is predetermined. By setting predetermined limits this policy emphasises the limits of cities impacts upon eco-systems. This policy emphasises the importance on reducing mans impact upon natural resources and eco-systems. There is recognition that the resilience of ecosystems can be permanently affected by urban sprawl. Alberti and Marzluff (2004) conclude that the replacement of eco-system services in urbanizing regions over the long term eventually reaches a threshold where eco-systems collapse. The setting of artificial thresholds through land-use restrictions does make clear that there is a lack of complete information of the impacts on eco-systems and the knock-on effects and costs that result from human activity. This restriction does encourage planners and designers to come up with innovative ways of designing cities to maximise our use of current resources. In a different way to environmental taxation, technological advancement is encouraged through restrictive policies because focus is much more on ways of adapting to current eco-systems and the limitations of natural resources. In Gill et al (2007) a case study of the Greater Manchester region illustrates adaptation techniques use to address the impact of climate change in an urbanized region. Overall Natural capital theory is more applicable to this policy because of the general principle of reducing impact on finite resources and recognition of the finite nature of eco-systems to adapt to mankind's interventions.

In conclusion I have sought to explain the theories of natural capital and environmental economics, examine similarities and differences and finally to assess how they influence environmental policy in action. Both of these theories influence how environmental policy is taken forward. Both theories seek to attach value to natural resources and eco-systems. The purpose of valuing the environment is different for both theories. Natural capital theorists seek to emphasize the overriding importance of the environment to all other parts of life while environmental economists are situated in market theory and place natural capital alongside other forms of capital in assessing costs and benefits. Through my analysis I have shown that two distinct types of policies draw upon each of these theories, one which emphasizes restricting man's impact on the environment because of limited resources and unknown effects and the other which seeks to use the market to compensate environmental costs but which also seeks to develop ways of continuing human growth and development while reducing environmental impacts through technology.

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