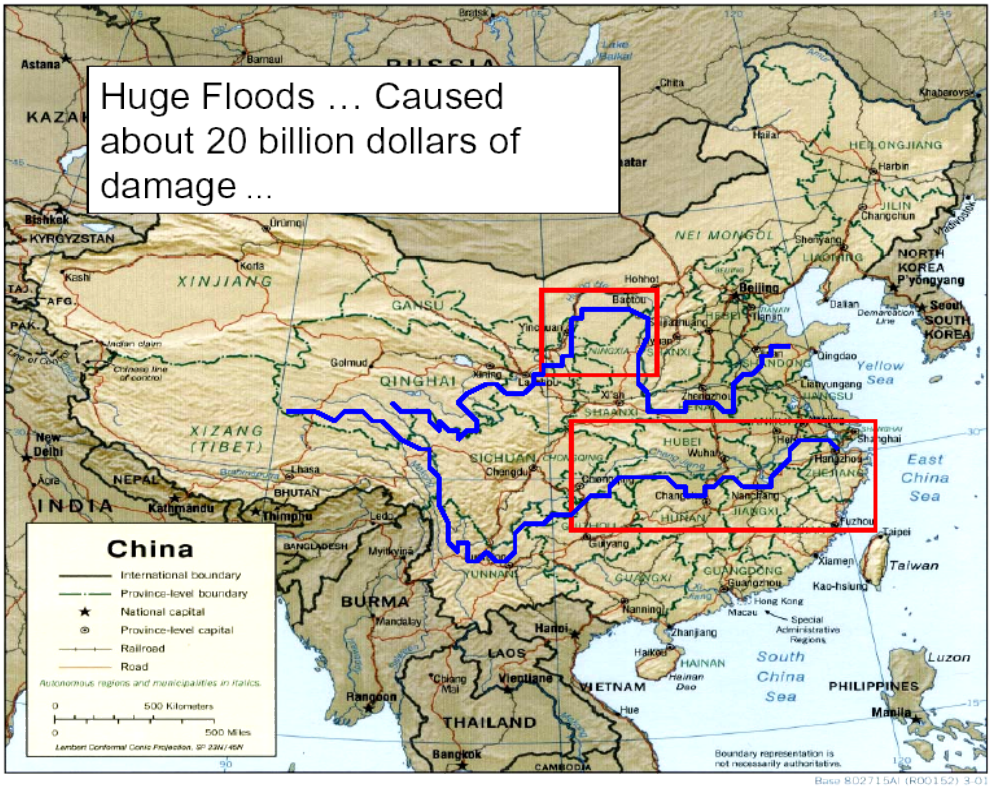
Why ecological sustainability comes to the fore

Study of the change of China's development strategy



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Why ecological sustainability comes to the fore

Study of the change of China's development strategy

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Preface

At the turn of the century, the Chinese government launched the western region development program, aiming to offer a better live condition to the impoverished population of China's western region.

The purpose of this study is to investigate why has Chinese leadership put ecological sustainability as the central task of the western region development program rather than ´´enrich local people first".

This report consists of 6 chapters. References to literature are made by the Harvard-method (surname of the author, year of publication). At the end of the report, a list of all the literature is presented. Moreover, two small cases are listed in the appendix part.

Acknowledgements

In the course of my study and the writing of this thesis I received much help from different people.

Firstly I would like to thank to those who offered me documents and books during my literature survey process.

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To all these my sincere thanks.

Content

1 Introduction and Problem Statement

In china"s history, many efforts have been made regarding western region development by the central government, from Yuan Dynasty to the current Chinese government. Development of China"s western region has been overshadowed for the last two decades by phenomenal economic growth with central government emphasis on the coastal cities, with their more advanced infrastructure and easier access to global markets.

Since China began its program of economic reforms in late 1978, the eastern coastal region has developed more rapidly than the western inland region. As a result, the economic gap between the eastern and western regions of China has been widening rapidly over the past 20 years. In 1999, the Chinese government publicly announced its official plan to develop western China. Its purpose is to try to achieve a satisfactory level of economic development in the western part of the country in a five- to ten-year time-frame and to establish a "new western China" by the middle of the 21st century.

In March 2000, Premier Zhu Rongji, on behalf of the central government, proposed that the major tasks of western region development are: (1) infrastructure construction (2) Ecological improvement and environmental protection, (3) Industrial development that takes account of local characteristics, (4) science, technology, education, culture and public health development, (5) Further opening to the outside world **(Zhu, 2000).** Moreover, President Jiang Zeming in his Xian Speech emphasized: Western region development must take ecological sustainability as the first priority **(Qu 2003).** This perspective manifestly expressed the trend of western region development: ecological sustainability has been placed at the top of the government's "Western Region

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Development Strategy" agenda **(Qu 2003).** There are some scholars who emphasized that 'enriching local people first' should be a priority in western development with poverty eradication as the most important task **(Hu and Wen, 2000)**. But it failed to be listed in the official document. It is notable that the Chinese government's strategy of developing western region puts the ecological preservation as the central task, which is the first time for a national economic program in China to do so **(Zhou 2002)**.

Many senior leaders of the Chinese government have also emphasized that ecological preservation should be given first priority in the west region development program. According to participants of the Western Forum of China: ´´Improvement of the ecological environment should top the agenda of tasks to be done'' **(PD[1], 06 September 2001)**. ´´If we say water resources, road construction, electricity and gas are the basic conditions for western regions' economic development, improvement of the ecological environment is the necessary base upon which these economic goals must be built." said Governor Cheng Andong in his speech **(PD, 06 September 2001).** However, how to achieve a good ecological performance in the western region has been the major concern of the "Western Region Development Strategy."

In the last several decades, Chinese government had chosen to vigorously pursue the economic growth in the eastern region, and China had been proud of the explosive economic growth, an averaged 8-plus percent increase in GDP over the past 25 years. ´Get rich first, Clean up later'' *(Xian Fu Qi Lai, Zai Zhi li Wu Ran)* was the modus operandi in response to Deng Xiaoping's statement that ´´Socialism is not poverty.'' *(She Hui Zhu Yi Mei You Ping Qiong)*. The famous slogan ´´economic growth is the source of everything'' has been prevalent for generations.

[1] PD is People's Daily, it is a official website of Chinese Communist Party

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In last several decades, neoclassical theory of economic growth had not only been taken as the most powerful ideology in China, for example Deng Xiaoping"s theory of „development is the only truth" *(Fa Zhan Cai Shi Yin Dao Li)*, but had also underlain what seems to most of Chinese people to be „common sense". It had constituted the official, dominant set of attitudes towards nature and environmental issues **(Qu 2003)**. As a matter of fact, western region is a traditional economic underdeveloped area in China, most of the population is still suffered with poor living conditions. The conventional approach for poverty eradication is to pursue rapid economic growth and encourage people ´´get rich first", and it has been examined in the China"s eastern region development. But in the western region development program, why does not Chinese leadership copy the same development approach rather than emphasizing ecological sustainability? With this in mind, this thesis investigates:

Why has Chinese leadership put ecological sustainability as the central task of China's western region development?

Research Methodology

2.1 Research design

In the Introduction I expressed the initial motivation and the research questions of this study. In this part I would like to present the research method of my study.

In order to obtain a valid and credible answer to my research questions, I decide to carry out this study according to Brox" model. In Brox" model there are several phases in research process, oriented to value neutral research. There are: research question, data collection, data handling/manipulation explanation, practical implication and feed-back phases. The reason why value neutral research method will be used in this report is that, the natural of this study is mainly literature studies, so it is necessary to be critical to ensure the validity of this study.

The overall goal of this investigation is to investigate why has Chinese leadership put ecological sustainability as the central task in China"s western region development program.

Considerable debates exist in the literature about the relationship between economic growth and the state of the environment. The most optimistic view sees economic growth as leading to an improved environment whereas the most pessimistic view sees these two aspects as antagonistic

As Harvey observes that ´´all ecological projects (and arguments) are simultaneously political-economic projects (and arguments) and vice versa"

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(Harvey in Bryant 1997). I think it is impossible to answer my research question without understanding the relationship between economic growth and the environment. Therefore, I started my study with the theories of neoclassical economics and ecological economics that offer different perception on the relationship between economic growth and the environment. Though both of the theories were developed by scholars of the West developed countries (such as OECD countries), china"s industrialization and modernization more or less followed the past and consolidated archetypes already implemented by the industrialized countries. However, the divergence of these two different theories generates some useful insights into the origins of problems with the environment, poverty, and sustainability. Through the study of these theories, I found that the economy and the environment are interdependent---what happens in the economy affects the environment which affects the economy. It demonstrates that the neoclassical development approach is not only incapable to solve environmental problem but also incapable to provide a basis for long-term economic growth.

Almost in a half century, Chinese leadership had taken economic growth as the first priority in China"s development strategy. Chinese leadership needed economic growth for many reasons, to eliminating poverty, to alleviating environmental degradation, to enhance technology. The life style and commodity consumption standard of West developed countries had been taken as a paradigm of successful economic growth. Since the economic growth seems so important to Chinese leadership, it is surprise that they did not put ´´get rich first"" into western region"s development strategy.

Therefore I hypothesis that Chinese leadership put ecological sustainability as the central task of western region development is a responding to the environmental critiques of neoclassical development and the requirement of

sustainable development.

With respect to policy change in China, Haggard **(1990)** argues that four distinct and overlapping factors which are: international political pressures, domestic politics, institutions of the state and spread of the ideas. It indicates that the change of the development strategy can't be explained by a single factor. It could be influenced by multi-factors. For example, China's environmental effects are not purely China's concern **(Tisdell, 1993b)**. I found that environmental developments in China are capable of having global impacts, for example its increasing use of fossil fuels is likely to accelerate global warming and loss of biodiversity in China is to some extent a global loss. Therefore, international society might require Chinese leadership to take more responsibility on environmental issues and adjust its development approach in the form of international co-operation. It is interesting to know if this international co-operation has had impact on China's development strategy.

With this in mind, in order to obtain a valid and reasonable answer to my research question, I would like to test my hypothesis from a broader angle, not only focus on western region, but also the other factors. These are the factors which I am going to look into: international implication, domestic implication and regional implication.

In short, this study is a descriptive study. The purpose of this study is not to generate a new theory or prove a theory but rather to test my hypothesis and eventually answer the research question with the help of existing theories. With this in mind, this study is to some extent guided by theories at the initial stage, in the sense that I had a theoretical framework in mind when I started my study. Theories served as conceptual frameworks that help to red what I have found in the sense that they are analytical tools.

2.2 Data collection method

The main resource of data collection and the method of data collection is literature survey. Through taking a close look into some studies that has been carried by relevant researchers, some neutral findings will be obtained. The literature survey analysis is content analysis and one of the drawbacks of this method is that it is indirect and at the same time it is non reactive. In other words, that document is not effected by the fact the reader uses it. Also it will be difficult to assess causal relationships. The documents can be written for some purpose other than the research and it can contain biases. Those disadvantages will be overcome by using a multi source approach.

During the literature survey, the selection of sound documents has been the starting point for the process. It is always extremely important to have documents that are properly formulated and serve for the purpose of the research, reliable documents had been chosen while deciding on the scope of the study, thus enhance the reliability and validity of this investigation.

In this study, because of the difficulty of obtaining data in English, a lot of data were translated from Chinese to English by author. Due to the limited English level of author, the reader might be affected by imprecise language.

The focus of this thesis is based on the consideration that research questions should be answered within the period of time of study. Moreover, during the study I have to be open-minded to accept any results that might emerge different from my expectations.

3 Theory of Economy-Environment Relationship

I have explained the purpose of the study of neoclassical and ecological economics in the previous chapter. In this chapter, I will take a deeper look at these theories which offer distinct understanding to the relationship of economic growth and the environment.

Now different authors in the field, with different intellectual backgrounds (ecology, physics, engineering, economics, political science, sociology), quite naturally have different emphases on these theories. However, for the purposes of this study and preventing my study from unmanageable, I shall offer the following definition of my theoretical construction: theories only study how ecosystem and economic activity interrelated. From this definition, it is clear that the subject matter of theories embraces the problems of economic growth and the environment, and all of these problems which emerged in China will be analyzed with the help of these theories in the later chapter.

3.1 Neoclassical economics

3.1.1 An introduction to neoclassical economics

In the 1950s and 1960s, economists developed theories of economic growth in which the natural environment did not figure **(Gareth et. a.l 2000)**. These theories implied that given proper economic management, living standards

could go on rising indefinitely **(Gareth et. a.l 2000)**. The pursuit of economic growth became a dominant objective of economic policy. One important reason for this was that economic growth seemed to offer the alleviating poverty in relatively painless way.

Starting in the early 1970s, neoclassical economics began to show renewed interest in the natural environment and it now includes the two important specialisations of environmental economics and natural resource economics. Environmental economics mainly concerns itself with the economy"s insertions into the environment, and with problems of environmental pollution. Natural resource economics concerns itself mainly with the economy"s extractions from the environment, and with problems associated with the use of natural resources.

The neoclassical economics view of the economy can be described as, ´´an independent, self-regulating and self-sustaining system, whose productivity and growth are not seriously constrained by environment"" **(Rees, 1999).** The underlying assumption is that all physical things ultimately consist of the same indestructible matter that is arranged in production, disarranged in consumption, and then rearranged in production. The economy is therefore envisaged as a closed flow from production to consumption to production again, where nothing is used up, only disarranged **(Daly and Cobb 1990).**

Neoclassical economists see growth as a very good thing, and to the extent that they understand it they hope to be able to advice on how to have more of it. Many neoclassical economists believe that, even in economies that are already rich, the pursuit of economic growth should be the most important objective of economic policy **(Michael and Sigrid, 2005)**. In particular, neoclassical economists see economic growth as the only feasible way to alleviate poverty

(Michael and Sigrid, 2005). Poverty thus became ´the moral justification for advocating ´a new era of economic growth"" **(WCED 1987).** Their argument is that in the absence of economic growth, the only way to improve the lot of the poor is to redistribute in their favour by taking away from the better-off and giving to the poor. They cite three problems about this way of trying to alleviate poverty. First, the better-off tend not to like it, and to resist it. Attempted redistribution is a source of conflict, sometime violent, as history demonstrates. And, if the better-off resist successfully, nothing is done for the poor. Second, typically the amount by which the better-off collectively are better-off than the poor collectively is not sufficiently large for it to be possible to solve the Poor"s problems this way even if it were possible to redistribute. Third, to the extent that redistribution is effected it may act as a disincentive to behaviour, such as saving and investing, which promotes the economic growth that is the best hope of the poor**(Michael and Sigrid, 2005)**.

It was acknowledged that a lot of current economic activity is unecological in its effect. Problems identified were basically the same as those named by environmental critique, that is, that economic activity was causing pollution, using up scarce resources, distributing ecosystems and destroying habitats. However, there was disagreement as to what the ultimate cause of these problems was. For neoclassical economists, environmental problems were seen to arise not as a result of economic activity as such, but rather due to the fact that many environmental goods are not priced. Neoclassical economists, therefore, do not consider it necessary to radically reform the discipline of economics, and argue that its prime concern is already the study of the allocation of scarce resources. They do however call for a refinement of tools and methods, and greater attention to environmental inputs and outputs of the economic system **(Pearce in Harward 1995).**

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From neoclassical economics point of view, environmental problems are seen as examples of ´´market failure´´, that is cases where markets fail to achieve their otherwise predicted socially optimal result. Therefore, neoclassical economists tend to favour market-based instruments, which means control environmental problem via a price mechanism **(Michael and Sigrid, 2005)**. This is a relatively new type of environmental policy instrument, whose appeal stems from the promise to reduce the total cost for achieving the environmental policy goal (or to achieve more for the same cost). Market-based instruments, such as emission charges, product charges, tax differentiation, subsidies, deposit-refund system and tradable permits, change the economic incentive structure for firms and or consumers. Market-based incentives modify the market's tendency to treat the environment as a free good by having the state place prices on environmental goods and bads.These more indirect interventions leave room for a flexible response to the environmental demands of society, mobilizing the knowledge of technological feasibilities and considering local physical constraints of individual actors.

The logic behind these instruments is that those polluters for whom it is easiest shall be encouraged to reduce their emissions by more than their equal share. As a result the environmental policy goal can be achieved at a lower cost to society. In other words, economic incentives not only allow firms to take different actions, but they also allow them to end up with varying levels of emission reduction. Because manufacturing plants, even those within the same industry, differ widely in their levels of technology and production pro eases, some will find it less expensive to undertake a given amount of emissions reductions than others. An economic instrument can achieve a given level of environmental protection for lowest overall cost by creating a framework that enable companies to respond according to their ability to make reductions. Ultimately, firms are either rewarded or penalised for their efforts. One company may

continue to emit more pollution, but pays a price for doing so. Another may undertake further control measures and achieve a lower tax bill, or revenues from sold permits. The overall impact on the environment will be the same, but the aggregate cost of the regulation will be reduced. Pearce *et al.* **(1989)** consider it to be a great virtue of market-based instruments: it "introduces flexibility into the compliance mechanism". Polluters with high abatement costs will prefer to pay up, those with low costs will install cleansing equipment: this produces lower compliance costs.

3.1.2 Environmental Kuznet Curve

In the last decade some neoclassical economists have advanced the argument that economic growth is, if there is enough of it, actually good for the environment. As actually made, the argument relates to insertions into the environment, and the damage that they cause. It is known as the Environmental Kuznet Curve, or EKC hypothesis **(Michael and Sigrid, 2005)**. ´´As a society becomes richer its members may intensify their demands for a more healthy and sustainable environment in which case the government maybe called upon to impose more stringent environmental controls,"" says Grossman and Krueger **(1991).**

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The Kuznets Curve

Figure 1
The Kuznets Curve

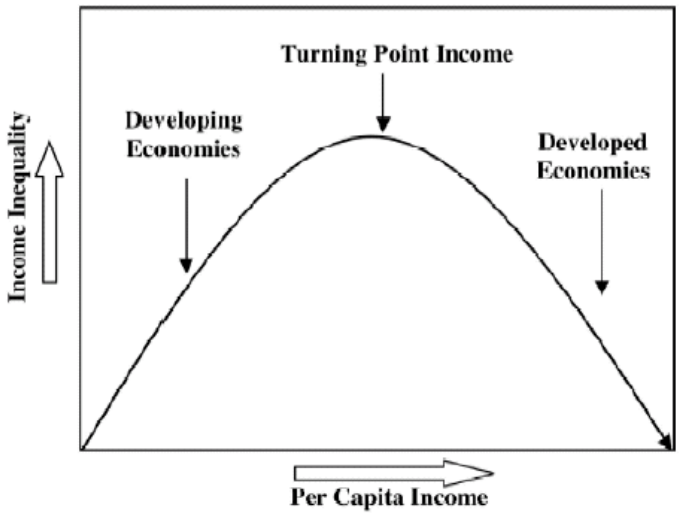

Figure 1 Kuznets Curve

Environmental Kuznets Curve

Figure 2
Environmental Kuznets Curve

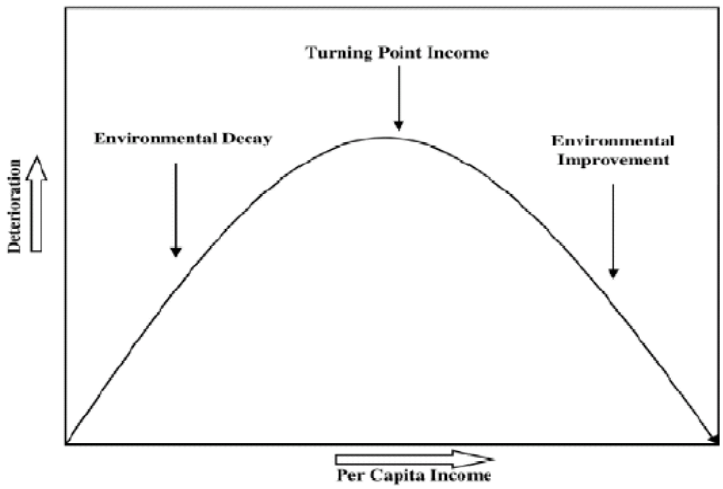

Figure 2 Environment Kuznets Curve

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In general, the EKC hypothesis is that as economic growth precedes so environmental damage first increases, then levels off, then declines. In the 1960s, economist Kuznets hypothesized that the relationship between in come equality and average per capital income in a growing economy took the form of an invert U **(Figure 1).** At low levels of per capital income, inequality increased with per capital income, but after certain level of per capital income further economic growth was accompanied by decreasing inequality. When, in the early 1990s, some economists came up with the idea of a similar inverted U **(Figure 2)** relationship for environment damage and per capital income, they identified it as the environmental version of the Kuznets idea. **(Michael and Sigrid, 2005)** The basis for hypothesizing this kind of relationship involves several elements. First, there is the matter of the structure of the economy at different stages of economic growth. The argument is that at low levels of per capital income economic growth involves industrialization, so that more energy and other raw material are extracted from the environment, leading to increasing insertions into it. On the other hand, it is the recent historical experience of the high Income OECD countries that the structure of the economy has changed with growth so that manufacturing sector has got relatively smaller and the service sector relatively bigger **(Michael and Sigrid, 2005)**. Modern high-income economies are sometimes referred to as „post-industrial" in recognition of this. Since the service sector is less resource-intensive, it is argued, its expansion at the expense of the manufacturing sector would imply the economy extracting less from the environment, hence interesting less into it **(Michael and Sigrid, 2005)**.The second idea is that as people become better-off, so they are willing and able to spend more of their income on improving environmental quality **(Michael and Sigrid, 2005)**. At now levels of per capital income, the satisfaction of basic needs such as food and shelter takes priority. As per capital income increases so these basic needs are increasingly satisfied, and people have money to spend on „luxuries", such as waste treatment facilities for the

improvement of environmental conditions. Given that basic needs are satisfied, people are more likely to be concerned about the quality of the environment. Once economic growth goes beyond a certain point, the argument goes, so people increasingly have both the desire and the means to reduce the impact of further growth on the quality of the environment. There is a third consideration that is relevant to the recent historical experience of many of the High income OECD countries, as well as the relative shift into services and away from manufacturing noted above, there has been a shift within manufacturing away from basic raw material processing towards activities requiring more highly trained labour and more technologically sophisticated capital equipment.

For instance, the Germany has actually declining coal extraction, and increasingly transports coal from China. This process has been largely driven by the fact that China can do raw material processing more cheaply that Germany can. Basic raw material processing is more environmentally damaging than high technology engineering. Some argue that it can work to improve environmental quality for Germany, but it cannot work for World as a whole, because there is no "another China" in which to relocate dirty raw materials processing activities. It also needs to be noted that there are some environmental problems for which this kind of relocation is irrelevant. In regard to the climate change problem, for example, what affects the climate everywhere is the global concentration of CO_2. It doesn't matter where the CO_2 is emitted.

3.2 Ecological Economics and economy-environment relationship

Continuing environmental pollution and destruction have led to a debate on the re-orientation of economic activity. The process of development, tied to the ideal of economic growth, appeared to be unsustainable. To a growing number,

the rules which guided two centuries of economic growth appeared to be reaching their limit. The key concepts in this debate are sustainable development and sustainability.

It is therefore from the late 1960s onwards that what are now viewed as seminal works in ecological economics appeared. These works, including ideas such as Kenneth Boulding"s „Spaceship Earth", Herman Daly"s „steady state economy" and Meadows et al. ´´the limits to growth", among others, stressed the closely intertwined relationship between economic growth and the biophysical capacity of the environmental system that supported it. Perhaps their key contribution was that they challenged the conventional wisdom that western society could continue indefinitely along its high-growth trajectory of economic development.

In the views of these writers, there were both physical and social limits to the success of high-growth economies. An economy that focused on producing more and more goods, and measured its success according to how many more goods it could produce, had limits of two kinds. It had physical limits because it could outgrow the environment that supported it; and it had social limits because as the economy grew it squeezed out sources of welfare not related to material goods. The early ecological economists thereby raised the question of limits to growth and the purpose of economic activity. Some of these concerns came to be recognized in the core concept of „sustainable development".

Ecological Economics deals with the interactions between humans and the natural world, interactions which themselves are ever evolving as the very interactions impact upon the ecosystem and alter it, and as perceptions of the environment also change **(Common 1988).** It was not until the 1980"s, with the formation of the International Society for Ecological Economists, that ecological economics became recognised as an academic field of inquiry. Its

basic premises are that the economy is embedded in the ecosphere and that the earth has a limited capacity for sustainably supporting people **(Wackernagel 1999).** The ecological economics started from assumptions about finite resources, limits to growth and potential scarcity **(Dietz and Straaten 1993).** To the issues of development, ecological economists often start from three assumptions: ecological sustainability is imperative; economic development is for human fulfilment: meaning all-round development and not just material things; and all must benefit from this development **(Ekins 1992a)**. They do not share neoclassical economists "unqualified enthusiasm for economic growth as a dominant policy objective everywhere. There are two broad reasons for this: The first is that they consider that economic growth is not, on account of economy-environment interdependency, a feasible long-run objective. From the point of departure of ecological economics, they think, that is very likely that continuing growth in average national income per capital will threaten the sustainability of the joint economy-environment system. The second reason has to do with the desirability of economic growth. Ecological economists do not think that it is desirable in the rich economics. They do think that it is very desirable in the economies where there are many poor people.

While market-based instruments are becoming more widely used, they have not come anywhere close to replacing the conventional, command-and-control, approach to environmental protection. These regulatory techniques, such as uniform reduction percentages across pollution sources, input restrictions, product requirements and technology-specific prescriptions, require specified economic actors to change their behaviour for the sake of achieving specified environmental goals. Ecological economists often oppose market based instruments on the grounds that they may fail to secure the desired environmental improvement**(Michael and Sigrid, 2005)**. There is also the fear that these instruments may give legitimacy to the act of polluting or that pricing

it may erode the level of environmental quality society desires to attain. Compare to market-based instruments, command-and-control instruments are seen by ecological economists to offer better opportunities for demonstrating care for the environment.

Another reason for the slow change lies in some weaknesses of market-based instruments**(Michael and Sigrid, 2005)**. Even when and where market-based approaches have been used in their purest form and with some success, such as in the case of tradable permit systems in the United States. A number of disadvantages of market-based instruments have become apparent with their actual use, such as negative distributional effects, less certain environmental effects than direct regulations, and difficulties in determining the required tax levels**(Michael and Sigrid, 2005)**. As Ekins argues that Microeconomic techniques are not able realistically to assess the economic cost of displacing millions of people from low-lying coastal areas (global warming); of hundreds of thousands of extra eye-cataracts and skin cancers (ozone depletion) **(Ekins 1994).**

Many argued that a failure to place the ´right" value on natural resource is the main cause of resource depletion. The central problem is that natural resources appear to be provided for a relatively lower price still, and therefore more of them are demanded than if they had to be paid for a higher price.

But since last decades, following the economic growth, the resource prices has been rising constantly in the market, but high prices do not signal scarcity, on the contrary, it encourage people to find more resources. Mark Elvin **(1998)** points out that ´´short-term reward from over-exploitation of resources intended to reduce any inclination to limit exploitation within sustainable limits.'" Like the case of whaling industry which is cited in Meadows et al. **(1992)**: ´a huge

quantity of capital attempting to earn the highest possible return. If it can exterminate whales in ten years and make a fifteen per cent profit, but it could only make ten per cent with a sustainable harvest, then it will exterminate them in ten years. After that, the money will be moved to exterminating other resource". Meadows et.al conclude that the market is blind to the long term and pays no attention to ultimate sources and sinks, until they are nearly exhausted, which it is too late to act." **(Meadows et al. 1992).**

Ecological economics arose in response to the inability of neoclassical economics to adequately cope with ecological issues **(Martinez –Alier 1999)**. During the last two decades, however, more and more scientists have demanded research in areas at the boundaries of, or even outside, traditional sciences. Example of these include the depletion of resource, destruction of the environment, the extinctions of species. These have posed new problems for humankind, which have demanded new responses. It is evident that all these problems stem from economic activity, so these problems have been a challenge for economists. However, since the negative repercussions of economic activity have become manifest in the natural environment, they have also been a challenge for natural scientists. It encompasses diverse patterns of thinking with multiple disciplinary roots, which arrows the ´´bigger picture" to come into view. Ecological economics can be described as ´´an attempt to correct the tendency for ecologists to ignore humans, and the social science world to ignore nature" **(Costanza et al. 1997).**

Georgescu-Roegen was one of the first economists to investigate rigorously the interplay between economic activity and natural environment in the light of thermodynamics. According to Georgescu-Roegen, natural consists only of what can be perceived; beyond, there are only hypothesized abstractions. His ideas about the relation between nature and human perception of natural led to a

particular epistemology concerned mainly with valid analytical representations of relations among facts. For Georgescu-Reogen, any worthwhile economic theory must be a logically ordered description of how reality functions. **(Mayumi 2001)**

The pinnacle of Georgescu-Reogen"s theoretical development may well be his ambitious attempt to reformulate economic process as bioeconomics, a new style of dialectical economic thought. His bioeconomics is not a new branch of economics. Rather, bioeconomics is a new discipline that combines elements of evolutional biology, conventional economics and biophysical analysis **(Miernyk 1999)**. Bioeconomics continuously highlights the biological origin of economic process and the human problems associated with a limited stock of accessible resources that are unevenly located and unequally appropriated.

In the work on Steady State Economy, Herman Daly argues that the economy growth in physical scale, but the ecosystem does not **(Daly 1991)**. Therefore, as the economy grows it becomes larger in relation to the ecosystem. Standard economics does not ask how large the economy should be relative to the ecosystem. But that is the main question posed by steady state economics. Standard economics seeks optimal allocation of resources among alternative uses and is, at best, indifferent to the scale of aggregate resource use. In fact it promotes an ever-expanding scale of resource use by appealing to growth as the cure for all economic and social ills **(Daly 1991)**. While not denying the importance of optimal allocation, steady state economics stresses the importance of another optimum-the optimum scale of total resource use relative to the ecosystem. A steady-state economy (SSE) is an economy with constant stocks of artifacts and people **(Daly 1991)**. These two populations (artifacts and people) are constant, but not static. People die, and artifacts Depreciate. Births must replace deaths, and production must replace depreciation. These „input"

and „output" rates are to be equal at low levels so that life expectancy of people and durability of artifacts will be high. Since the input flow of matter-energy equals the output flow when both populations are constant, the two flows may be merged into the concept of „throughput" **(Daly 1991)**. The throughput flow begins with depletion, followed by production, depreciation, and finally pollution as the wastes are returned to the environment **(Daly 1991)**. The economy maintains itself by this throughput in the same way that an organism maintains itself by its metabolic flow. Both economies and organism must live by sucking low-entropy matter-energy (raw materials) from the environment and expelling high-entropy matter-energy (waste) back to the environment. In the SSE this throughput must be limited in scale so as to be within the regenerative and assimilative capacities of the ecosystem, insofar as possible. **(Daly 1991)**

Economic growth is currently the major goal of both capitalist and socialist countries and, of course, of third world countries. Population growth is no longer a major goal for most countries, but the usual reason for urging slower demographic growth is to make room for faster economic growth, as China's ´´one child policy". Economic growth is held to be the cure of poverty, unemployment, debt repayment, inflation, balance of payment deficits, pollution, depletion, the population explosion, crime, divorce, and drug addiction **(Daly 1991)**. In short, economic growth is both the panacea and summum bonum. This is growth mania. World leaders seek growth above all else. Therefore to oppose growth, to advocate a SSE, is not something to be done carelessly. One must present good reasons for believing that the growth economy will fail and also offer good reasons for believing that a SSE will work. This is the aim of the SSE **(Daly 1991)**. The steady state economy is a very important precursor of the concept of sustainable development, which at the current time dominates the debate regarding economic development.

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The ultimate challenge to the neoclassical economic growth paradigm appeared to come from the environmental critiques. It arose initially from a growing awareness of problems relating to such things as air and water pollution, nuclear power plants, and pesticides. Then came *the limits to growth* report **(Meadows *et al.* 1972)** which predicted the eventual exhaustion of the material resources on which development was based. „Under the assumption of no major change in the present system, population and industrial growth will certainly stop within the next century, at the latest" **(Meadows et al. 1972).** The fundamental problem, according to *limits to growth*, is that economic growth in resource use, industrial output, population and pollution is exponential, that is, increasing by a constant factor. Exponential growth displays a gentle and gradual curve for a long time, but rapidly shoots up in a very short period. Simon and Kahn **(1984)** questioned the accuracy of *limits to growth.* They argued, correctly, that economic activity everywhere was becoming more energy efficient, and that resource prices were falling. They regarded the latter as signifying that resources were becoming increasingly available over time, forgetting, however, that conventional markets take only a short term perspective, and prospects over, say, a century do not affect prices now. Two decades later, says Ekins **(1993)**, even resource optimists accept that there are limits of some immediate relevance, and that action must be taken to at least modify the workings of the economy. At the same time, resource pessimists are now more cautions in their pronouncements.

Human economic activity has always involved the material and energy exchanges with its environment. It would be impossible for humans to satisfy their needs without interacting with nature. For most human history, mainly because there were few humans, the level of interaction did not much affect the functioning of the environment, except locally. However in the last three centuries the magnitude of the interactions has been increasing rapidly. The global scale of human economic activity is now such that the levels of its

extractions from and insertions into the environment do affect the way that it works.

Natural resources are not infinite, as Roefie Hueting **(1992)** says: the heart of the conflict (between production and the environment) lies in the finite carrying capacity of the environment. More and more natural resource exploitation means that the natural environment can not meet existing demands, therefore we must increasingly choose what functions the environment is used for. Thus if the renewable resource use exceeds the rate of regeneration, non-renewable resource use exceed the rate of development of sustainable substitutes, the development will be affected.

If the joint economy-environment system is operating as required for sustainability, it is in a sustainable model of operation, otherwise it is unsustainable. The scholars who set up the International Society for Ecological Economics in 1989 were largely motivated by the judgment that the way the world economy was operating was unsustainable **(Michael and Sigrid, 2005)**. They were concerned by what they judged to be threats to sustainability, features of current economic activity that could undermine the capacity of the joint economy-environment system to continue to satisfy human needs and desires. Climate change is an example of a threat to sustainability. **(Michael and Sigrid, 2005)**

Sustainability is about equity as between those alive at different points in time, about intergenerational equity. Adopting sustainability as an objective means acting now so as to leave the joint economy-environment system as well able to satisfy the needs and desires of future generations as it is able to satisfy ours. Sustainable development means increasing the capacity of the joint system to do that, if sustainability is not achieved, sustainable development will not be.

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Therefore, ecological economics, with its inquiry into the sustainable development, marks itself as a paradigmatic challenge to the dominant neoclassical paradigm.

3.3 Summary of the theories

Since neoclassical economics and ecological economics have different judgments on nature, and their attitudes towards nature are based on different assumptions. Neoclassical economics claims to be positive, that is, value free-merely a statement about the way world is. The claim is contentious, because neoclassical economics start from value-laden premises, for instance the Environmental Kuznets Curve. While neoclassical economists are advocating that markets are the most efficient way of allocating resource, the ecological economists, for instance, *limits to growth*, with firmly asserts that markets can only delay, not avoid, overshoot and collapse. Markets operate through feedback mechanisms which themselves involve environmental costs, and are further impaired and distorted by imperfect information. That is, there is no corrective feedback to keep competitors from overexploiting the commons, and even Pearce et al. **(1989)** acknowledge that sustainable development requires equity within and between generations.

The idea that it is important to maintain a capacity implies that it is sufficient. In fact, in the second half of the twentieth century many scholars argued that the capacity of the joint economy-environment system to deliver human satisfactions needed to be increased rather than maintained **(Michael and Sigrid, 2005)**. A major feature of the current human condition is the existence of mass poverty. The generally accept remedy for poverty is economic growth, increasing the scale of economic activity. Here is a major problem. On the one hand, many judge that the current scale of global economic activity threatens

sustainability: threatens to reduce the future capacity to satisfy human needs and desires. On the other hand, many argue that it is necessary to increase the scale of economic activity to alleviate poverty. Dealing with poverty now, it seems, is going to create future economic problems, via the environmental impacts arising from increasing the scale of current economic activity. **(Michael and Sigrid, 2005)**

Ecological concerns didn"t make much of an impact on economic growth debates until the end of the 1980"s. The response varied, from those who called for a halt to economic growth and a radical reorganisation of social life **(e.g. Herman Daly 1991)**; to those who argued that the environment problem confirmed the need for more and rapid economic growth **(World Bank in Sutcliffe 1995).** Others who took physical limits seriously still believed that environmental factors could be taken into account within a somewhat more complicate, but basically unchanged approach. Rather than seeing ecological problems and continuing poverty as a signs of failure of economic growth and development, they were taken up as challenges to be overcome by technology and good management.

Sustainable development is central concerns of ecological economics, which has been defined as the science of sustainability, but not of neoclassical economics **(Michael and Sigrid, 2005)**. Ecological economics judge that serious threats to sustainability exist, and they are somewhat skeptical about the feasibility of sustainable development. Neoclassical economists do not claim that there are no threats to sustainability, but they judge them to be less serious than do ecological economists, and they tend to believe that sustainable development will come about given some relatively minor policy changes **(Michael and Sigrid, 2005)**. They have confidence in the ability of markets to drive technological and behavioral changes that will enable the capacity of the

economy-environment system to satisfy humans to go on increasing.

The neoclassical view of the economy, as an isolated system, is in stark contrast to ecological economics which recognizes an intimate connection between the human economy and the natural environment. From this perspective, humans do not simply take out resources from nature or put back waste; rather all consumption and production processes are within nature as are humans themselves. The economy in this view can therefore be described as ´´an inextricably integrated, completely contained and wholly dependent subsystem of the ecosphere‟ **(Rees 1999).** It points out that change in the way that the environment works affects its ability to provide services to human economic activity. Another way that we shall sometimes put this is to say that the economy and the environment is a joint system. It is a very important central idea in ecologic economics that maintain the capacity of the joint economy-environment system to continue to satisfy the needs and desires of humans for a long time into the future. Sustainable development, says Porritt **(1992)**, emphasises not growth but ‟improving the quality of human life while living within the carrying capacity of supporting ecosystems‟ and preserving biological and cultural diversity.

4 Practical implication

Through the study of theories, we have obtained a comprehensive understanding of the relationship between environment and economic growth. The conventional stance of neoclassical economics maintains that development, primarily in the form of economic growth, will provide the conditions necessary to alleviate poverty and resolve environmental problems. However, after a half century of economic growth, the poverty and environmental problem has not been solved. It appears that the neoclassical vision of development is lacking not only the necessary social and political basis but also the material base for realise sustainable development.

Based on this understanding, I tend to think that the change of Chinese leadership"s development ideology has been influenced by external pressures which are resulted from the deficiencies of neoclassical development approach. Thus, I hypothesis that Chinese leadership put ecological sustainability as the central task of the west region development is a responding to the environmental critiques of neoclassical development and eventually a responding to the requirement of sustainable development. In order to obtain a valid result, I will test this hypothesis by investigate three factors: international implication, domestic implication, regional implication.

4.1 International implication

Environmental problems were once commonly believed to be solvable in isolation from social issues, but this changed with the arrival of the influential Brundtland Report. In 1983 the United Nations established a Commission on the Environment and Development (UNCED) to address these broad issues, under the chairmanship of Cro-Harlem Brundtland, the future prime minister of

Norway. The commission consulted widely across a spectrum of issues and four years later published its findings in a report, Our Common Future **(WCED 1987)**, also known as the Brundtland Report.

This report is now acknowledged as a landmark publication in the development of environmental awareness and particularly the need for environmental concerns to be integrated into all aspects of successful development. The most famous quotation from the Report is that defining the key concept of „sustainable development", which is described as „development that meets the needs of the present without compromising the ability of future generations to meet their own needs" **(WCED 1987)**. Within this definition the needs of the poor in all societies were particularly stressed, and the limitations imposed by technological and social factors on the ability of the environment to meet needs across generations.

Another important section in the sustainability debate can be noted in the UNCED Conference on the Environment held in Rio de Janeiro in 1992, also known as the Earth Summit. The Earth Summit was one of the largest international gathering ever held and produced a number of important publications, although relatively few firm commitments. The scale of the event was, however, itself an indication of the seriousness with which environmental issues were being addressed. Following the Rio conference the issue of defining sustainable development has become central

Three documents emerged from the final Rio process: a broad non-binding statement of principles relating to development and the environment, called the Rio Declaration on Environment and Development; a declaration on forest management principles, also non-binding; and a detailed program of action principles at national and international level, called Agenda 21 (meaning an

agenda for the twenty-first century). The conference's declaration in Agenda 21 embraced the idea that sustainable development must allow for improved living standards and economic growth while still preserving the environment: "Integration of environment and developmental concerns ... will lead to the fulfillment of basic needs, improved living standards for all, better protected and managed ecosystems and a safer, more prosperous future."

All these international activities have demonstrated that today the environment of most countries is not solely their own business. This is particularly so in China"s case because its immense size both in terms of population and land area. The main reason why a country"s environment concerns the rest of the world is the presence of externalities from the state if its environment. China"s rapid economic growth and its environmental impacts are so large that they can not be ignored by the rest of the world. Some of its impacts are global. A recent example was the emissions of CFCs, a threat to the ozone layer.

Moreover, China"s environmental change which caused by reckless economic growth has transboundary effects. It is the source of major rivers which are to a large extent the economic life-blood of Indo-China, Burma and Bangladesh. Environmental actions by China which pollute these rivers, reduce their water flows have considerable economic and environmental impact in China"s neighboring countries. Again, China"s unrestricted economic growth generates a considerable amount of acid rain. Some of this is transported to neighboring countries. There have for example been complaints in parts of Japan that acid rains are responsible for the deaths of some trees in the vicinity of Hiroshima.

Even in the absence of an international regime, global influence shape the policy process by expanding awareness of environmental harms and disseminating scientific knowledge As an active member of international society, it seems that China can not ignore the co-operation of pursuing sustainable

development by the whole international society. Preparations for international conference-such as the Brundtland Commission in 1987 and the United Nations Conference on the Environment and Development in 1992 required governments to produce position papers outlining the relationship between the environment and development. It shows that preparations of these papers attracted the attention of policy elites in China and created a political space for those in and out of government who wanted to see more environmentally friendly pollution management policies. International treaties such as the Montreal Protocol, the Convention on International Trade on endangered species and the Kyoto Protocol demands governments to work out their own position on these treaties.

Moreover, The Convention on Biodiversity, adopted at UNCED, was seen to impose substantial constraints on development in selected, generally undeveloped areas in order to conserve biological diversity. China's former Premier Li Peng endorsed the Convention in his address at UNCED and that China was the first major state (and fifth overall) to ratify the Convention. The Biodiversity Convention nevertheless does present constraint on China's development. **(Lester Ross 1998)**

As a result, in the mid-1990s. The Chinese government made "sustainable growth" the basic strategy of national development and began to pay comprehensive attention to environmental problems by publishing China's 21st Century Agenda-a white book on China's population, Resources and Environment. The Agenda was the first government initiative to take an integrated perspective of the economy, society, resources and environment and contemplate these environmental and resource constraints and the potential crises facing China's development. The Agenda presents a comprehensive framework for evolutionary and sustainable development. Its publication was a

significant event for China"s environmental protection and development. In China"s 21st Century Agenda, there are 450 actions of the government"s ""green departments"", including construction of laws and organization, and policy measures, which are termed ""green policies"". The white paper points out that China"s economic growth is hampered by its large population, relatively inadequate natural resources and fragile environment as well as it low capabilities in science and technology. It suggests that this requires holistic co-ordination of China"s economic growth.

China"s entry into the WTO and the requisite conformity with the WTO"s rules and obligations has complicated the countries growth and development. As the world globalizes, the effect that the development of one nation has on the rest of the world is exacerbated. With China"s population of 1.3 billion people, its sheer size alone mandates its integration into world economy and world ecology, and requires careful consideration of the country"s development. For example, China"s increased demand for many raw material needed to support its rapidly increasing economy has created worldwide shortage and dramatically increased prices around the world. **(Kristen 2005)**

As Jessica Mathews **(1997)** observed, the growth, spread and development of international civil adds to these more formalized international environmental political pressures. During the negotiation period of China"s WTO membership between USA and Chinese government, the environmental situation was highlighted and serve red as a barrier for China"s entering into WTO. International Non-government organizations (NGOs) regularly lobby Chinese government and international organization working in China to save particular species, protect forests rich in biodiversity and ´´green"" bilateral and multilateral agreements. Chinese government has also had to contend with efforts by environmental NGOs in developed and developing countries to

´´green‟‟ the WTO. Pressures from international aid donors also affect the domestic environmental policies by requiring environmental impact assessments for large infrastructure projects, by providing loans for environmental capacity building and by integrating the environment into all aspects of leading.

All environmental agreements impinge on national sovereignty to some extent in that they require the parties to ensure that activities within their jurisdiction or under their control do not damage the environment of other states or the global commons.

In the mid-1990s, former President Jiang Zeming in his address to the Fourth National Environmental Protection Conference on 16 July 1996 acknowledged that environmental protection had entered the arenas of international politics, economics, trade and culture, and expressed China‟s willingness to play a positive role in global environmental protection.

Although initially an environmental laggard, China has become a more active participant. A recent compendium edited by SEPA‟s Policy and Law Section listed 29 multilateral environmental agreements to which China has become party (**Lester Ross 1998).** Although the data do not permit definitive conclusions with respect to patterns of China‟s participation in international agreements, it appears that, over time, China has generally become more willing to participate in such agreements and to do so at an earlier data (**Lester Ross 1998).**

It indicates that environmental protection and sustainable development in the international context has a certain pressure on Chinese‟s development approach. China is now a ready participant in international environmental protection and has procedures in place establishing the policy making bodies that will

co-ordinate the positions of various agencies in formulating positions and implementing strategies with respect to such pressure. Therefore, since recently, China has embarked on a long-term course to formulate and implement increasingly stringent environmental policies (**Lester Ross 1998).** It is important that China"s development does not threat the global commons.

4.2 Domestic implication

If solutions to international environmental issues are predominantly of the co-operative type, then the predisposition of the state in question assumes major importance. If the state lacks knowledge or impervious to information concerning the existence of particular problems, their salience and the most effective means for their resolution, the prospects for co-operation are correspondingly limited. Conversely, if the state exhibits a tendency to acknowledge the existence of environmental problems internally and take action on them domestically, then the prospects for international progress through co-operation and encouragement of the state"s environmental policy-making capacity are enhanced. (**Lester Ross 1998).**

But before investigating the domestic implication, it is important to take a close look at the roots of China"s environmental problems through a historical review.

4.2.1 The root of China's environmental problems

After the birth of the People"s Republic of China in 1949, the Chinese Communist Party (CCP) launched a mammoth socialist movement under Marxist, Leninist and Maoist thought. Mao"s theory on natural was exploitative.

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It is consistent with the neoclassical economics theory on nature, i.e. the natural environment has only instrumental value, with the presumption that science would provide solutions for environmental problems **(Gareth et. a.l 2000)**.

But the years of Mao Zedong were not friendly to China"s natural environment. To be noticed, especially for the communist country like China, Marxist theory on environment has a profound impact on China"s contemporary development. Since China"s leadership purported to employ the mechanism of unified planning with due consideration for all aspects of the economy and the society, which was supposedly more superior than in a capitalist system, the Chinese government did not recognise environmental problems. The aim of socialism was to satisfy the needs of the masses, so how could it damage the masses? It was only in a capitalist society, where capitalists received profit at the cost of environmental destruction regardless of the welfare of workers and peasants that environmental problems existed. However, there was the question of why the Soviet Union had environmental problems, where socialism was built for the first time in the human history. In Mao"s era, China did not have an environmental policy, even if environmental problems had already appeared. It is noteworthy that empirically the environmental performance of the former eastern block is, in general, poor relative to that of the developed capitalist world, at least with regard to pollution control. Indeed, both Professor Yunchu Ma, who advocated the control of population growth, and Professor Wanli Huang, who opposed the construction of the Sanmen Xia dam on the Yellow River, was criticised.

´The roots of China's dire environmental problems can be traced to Mao's misrule"" Judith Shapiro **(2001)** argues in her engaging book *Mao's War Against Nature*. Even though Mao's goal was admirable: to halt the river's regular flooding and generate electricity to power China's fledgling industrial revolution.

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As same as the controversy of building ´´Three Gorge‟‟ today, the construction of Yellow River's Sanmenxia dam in 1962 was attacked by hydropower engineering Huang Wan Li, he argued that Mao's plan was unmitigated folly, and that the 1.3 billion tonnes of silt sloshing along the Yellow River every year would dog the dams generators and make flooding worse. For criticizing the Great Helmsman, Huang was sent to a remote reservoir project to break rocks. As Huang had predicted, flooding and human suffering followed soon after the Yellow River's Sanmenxia dam was completed. Today, China has halted electricity generation at the dam, and bored large tunnels in it to let through sediment and ease flooding. "Mao constructed a world that pitted humans against nature, and inculcated this world view among the people through repression, indoctrination, Utopian promises, and censorship," Shapiro **(2001)** writes. Shapiro **(2001)** argues persuasively that the human suffering that invariably accompanied Mao's destruction of China's environment was not an unforeseen side effect of his ill-thought-out development schemes, but an important goal in its own right.

"From the Maoist point of view, these disruptions were a useful means of breaking through the structures of traditional culture so as to build a new society and ´´new socialist man." During his decade at the helm, Mao Zedong pushed his version of development with reckless disregard for environmental consequences, viewing the environment as an adversary to be conquered. For Shapiro, ´´ the relationship between humans and nature under Mao is so transparent and extreme that it clearly indicates a link between abuse of people and abuse of the natural environment.‟‟

But as a matter of fact, the environment suffered less under Maoist rule than it would subsequently during China‟s post-1978 period of unbridled economic growth **(James 2005)**. In last two decades, China's goals were different, but

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Shapiro **(2001)** argues that the effect on the environment is the same, and that China's quest for economic growth at any cost has worsened the misuse of natural resources in China, and exacerbated Mao's impact on China's wilting natural patrimony.

By December 1978, Chinese government embarked on economic reforms to shift from a socialist industrial country to a more open-door economic policy of outward-oriented industry. The conversion from a centrally planned economy to a socialist marketing economy posed many problems for china, especially environmental problem. In ´The limits of Market Triumphalism in Rural China,"˜ Muldavin describes the emergence of a capitalist-socialist hybrid system ´´that tends to draw on many of the worst aspect of both."˜ He says that environmental degradation is structurally embedded in the new order, and that problems will not simply go away with the completion of the transition to a market economy **(Muldavin 1998)**.

The post-1978 materialist view is the dominant environmental in China with one legacy from the Maoist era-which nature was seen as something to be conquered. And in fact, this materialist attitude towards nature predominated among Deng Xiaoping era leadership into the early 1990s at least. ´Get rich first, Clean up later"˜ has been taken to imply that economic growth will eventually compensate or offset the environmental impacts of the early stages of economic development and that growth will lead to further environmental improvements. Far from being a threat to the environment in the long-term, economic growth is necessary in order for environmental quality to be maintained or improved.

To be noticed, for most of the Chinese Bureaucracy in Deng Xiao Ping"s era, the goals of economic growth and environmental protection are not seen as

mutually exclusive: economic growth will eventually help to pay for environmental clean up. Thus while a growing number of people in China are aware that science and technology have exasperated ecological problems in many cases, most of the leadship and much of society at large appear to believe that technological fixes can be found for most environmental woes.

This view can be deemed as „techno centrism", as O'Riordan calls it, represents in modern western societies the official dominate, set of attitudes to the environment. It is outlook of those groups in society, which excise most power. It is characterized by an apparent rationality, a belief in an „objective" approach, and a conviction that although careful management must be excised in order to avoid fouling the environmental nest, man is able to manipulate and appropriate nature for his own ends-and is justified in so doing. The high technology and material consumption which is achieved through this appropriation is regarded as the ultimate indicator of social progress, Progress is attainable by knowing and manipulating natural laws, ergo those who know most about those laws, the objective scientific „experts", are those in whom trust should be placed when it comes to decision-making about the environment. **(David Pepper 1984)** As Atkinson **(1991)** points out: science was from the beginning a tool with which to advance the interests of certain individuals, classes and nations-and in the end a particular culture-against all others. This belief was cemented in the minds of party elders in some key positions. But as a matter of fact, following the younger North American-, European-trained officers took the power, they have been more critical of technological fixes and end-of-pipe solutions than their elders and their voice has been increasing to the decision making.

By 1990, China's environmental protection policies were based on the principle which is ´´make the polluter responsible for treating it".**(State council 1996)** There was a pollutant discharge permits system, and local environmental

protection bureau which had the power to collect fees and levy fines for excessive discharge of pollutants.

The rationale behind this system is: the outcome of this excessive discharge results in external environmental or social cost which is imposed on third parties– what economists euphemistically term ´´externalities"". The first step to correcting this problem is then to calculate the market value or ´´shadow price"" of these environmental cost and benefits **(Jacobs 1997)**. This is done by defining the consumers" average willingness to pay for benefits or avoid cost. Once the value of these external cost are defined, they can then be ´´internalized"" or brought back within the market by raising prices of damaging activities through taxes, charges, tradable permits and so on **(Jacobs 1997).** By using a single measure of monetary value, costs and benefits can be compared to one another. Assuming then that prices have been correctly calculated, total ecological damage will be reduced to the point at which marginal cost equal marginal benefits.

But this system has not brought a sound environment to China; on the contrary, the environmental degradation had been accelerated in the last decades. During the Reform-era, in order to attract and maintain Foreign Direct Investment, the fee of pollution discharge had been set at a relatively low level. Relatively low environmental standard was not only one of the main reasons to form China"s ´´World Factory´´ situation but also the cause of huge environmental crisis. As Judith et.al. **(2004)** argue that one of the most contentious debate today is whether pollution-intensive industries seek locations with weak environmental standards and turning these locations into ´´pollution heaven"". The main argument is that stringent environmental standards in industrial countries drive firms to close down their plants at home and establish them instead in developing countries, where standards are relatively weaker. Since more pollution intensive industries will have a larger incentive to move, a haven of

such industries has been built in China.

It indicates that there is more scope for using market-related instruments as means of exerting environmental control in China. While up to a point these instruments are likely to be useful in balancing economic activities in a way which takes account of their environmental externalities, they may be of little value in addressing the level of environmental impacts from the scale of economic activity and on their own, may fail to conserve that natural environmental resource stock adequately. Price mechanism does, it seems, have limitations in relation to environmental issues even when they operate extensively to take account of externalities **(Tisdell, 1990)**

These problems revealed that when solutions concerning the environment are based on neoclassical economic rationalizing, a one dimensional monetary value is applied to problems which are multidimensional in scale. Martinez-Alier concludes that ´monetary values given to externalities appear as a consequence of political decisions which are themselves often based on spurious economic arguments" **(Martinez-Alier 1999).**

4.2.2 Domestic pressure

The Greenpeace China's first national state of the environmental report shows that direct economic losses from the environmental pollution have amounted to 3% to 5% of China's annual gross domestic product $ 30 billion- during the 1990s. Yearly losses from natural disasters are expected soon to reach $2.5 billion. Acid rain produces annual losses of 1.8 billion. Around 10 million hectares of farmland are polluted, causing a loss of some 12 billion kilograms of food each year. Among China's 600 cities, over half have insufficient water supplies, and 108 face serious water shortages. Coastal factories and cities

annually channel an average of 10 billion tons of sewage directly into the sea.

China"s rapid industrialization in the last decades has engendered serious problems of depletion of natural resources, degradation of major ecosystems, and pollution extending far beyond its borders. **(Economy 2004)** Recently, environmental problems have caught great attention in China. Three ecological events in the final years of 20th century sounded alarms. They were: (1) Yellow River discontinued for 227 days in 1997, (2) Yangtze River flooded seriously in 1998, (3) Sand and dust storm swept Beijing and other places in 2000. The three events marked the commencement of a new era, in which accumulated nationwide ecological destruction has begun to have a directly adverse effect on the people. **(Chen 2004).**

Environmental degradation in China is severe, and this degradation, alone with her massive population and unprecedented economic development, presents significant barriers to sustainable development. Economic growth has led to, as well as rapidly rising demand for energy. The rapid economic growth threatens not only to further degrade china"s environment but also leads to major questions as to how china can actually benefit from its economic growth.

Owing to great destruction by unsustainable development, the ecological environment is seriously threatening the economic and social development. Recent assessments of China"s performance **(Yu-shi et al, 1997)** make explicit the rapid degradation of environmental capital resulting in the significant loss of both source and sink capacities.

The need for the parallel objective of reducing pollution is directly experienced in the provinces, cities, and countryside. Five decades of aggressive industrialization has seriously degraded all natural resources. The Natural

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Capital accounts for current and future generations show the massive debits of polluted rivers, cleared mountains, depleted soil, and coal and steel mine sites full of toxic materials.

As a result, many scholars started to argue that the validity of EKC Hypothesis to China is contentious **(Li and Zhang 2003).** First, evidence is limited to a small number of localized pollutants, primarily sulphur and particulate matter. Second, evidence of the EKC relies mostly on data from developed nations. Third, recent studies have found that the ´´turning point‟‟ is significantly higher than original estimates.**(Mabey, McNally and Zarsky, 2003)**. As O‟Connor **(1994)** and others **(Hettige et al., 1998)** have argued, the relationship between some measures of environmental quality (the concentration of suspended particulates in air and development (as manifest by rising per capita incomes) exhibits an inverted Kuznets U pattern. Environmental quality, as measured by some pollutants, initially worsens as incomes per capita increase. Moreover, in practice, as in China, the environmental and resource degradation at lower levels of income often results in irreversible losses **(Mabey, McNally and Zarsky, 2003)**. Thus the neoclassical growth approach has also attracted enormous critiques from domestic actors, and generated much controversy.

However, these problems suggest that a shift in ideas regarding the relationship between economic growth and environment. For most of human history and for much of the world, including China, the dominant idea regarding the relationship between economic growth and the environment is embodied in the phrases ´´growth first clean up later‟‟, this phrase reflects the idea that neither poor people nor poor (developing) economies can afford to invest in the environment, or economic growth will be the cure for all the evils.

There is little doubt that until recently political leaders and policy-makers in developing countries and international organizations thought and acted this way.

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Because of this, it is not surprising that most developing economies, including China, more or less followed the ´´grow first clean up later‟‟ neoclassical development approach adopted decades earlier by countries with in OECD. However, this approach has failed to solve environmental problem and is lack of evidence to provide environment improvement in the future.

While China's stunning double-digit growth rates have made headlines around the world, the price of environment being paid is both huge and, say advocates such as Pan Yue, deputy director of State Environmental Protection Administration (SEPA), unsustainable **(EuroBiz 2004)**. It pointed out that economic development does not equal to material growth. As we shall see, from neoclassical point of view, when one speaks of sustainability, one is not concerned with the conservation of an existing and unfolding natural, but with the long-run preservation of an economy, which is essentially dependent on the use of natural resources and the environment as a receiver of its discharges of productive and consumptive activities. It explains how neoclassical theories of economic development alone with the values of industrialised social systems, coevolved around an energy-intensive based economy. As Liang Congjie, China's leading independent environmentalist said multiplying current trends by a population of 1.3bn make it obvious that a West development model will not work. Liang argued: "If Chinese wanted to live like Americans, we would need the resources of four worlds to do so." **(EuroBiz 2004)**

As Harward argues that ecological devastation has not become systematic due to industrialisation per se, but rather due to an inherent economic logic which tends towards an infinite exploitation of natural resources, and requires continuous growth to survive **(Harward 1995).**

Though neoclassical economics theories had been dominating China‟s economic

development for decades, the Chinese leadship and academia has recently been beginning to question the ´´scientific‟‟ nature of neoclassical development approach, pointing not only to the various ecological problems already mentioned, but also questioning its construction of the history of economic ideas **(He 2000)**.

China cannot afford to keep its economy growing the way it is-the strain on the country's population, resources and environment has reached breaking point. This assertion was not the intellectual musing of a green pressure group. It was the conclusion of the State Environmental Protection Administration (SEPA) **(James 2004).** Pan Yue, deputy director of SEPA, said China adopeted the west's resource-hungry model of development even though it was unsuited to a country with a huge population, limited agricultural land and scarce resources. "If we continue on this path of traditional industrial civilization, then there is no chance that we will have sustainable development," Pan Yue said. "Because China's populace, resources, environment has already reached the limits of its capacity to cope, sustainable development are the only road we can take." **(James 2004)**

Pan's comments made for a sobering wake-up call, but not one that was particularly new. Others in the upper echelons of China's government have made similar comments over the years about the unsustainability of China's ultra-fast economic growth. Take this, for example, by Deng Nan, daughter of Deng Xiaoping and then Vice President of the State Science and Technology Commission: "It is possible that development will bring about destruction of the ecology and worsening of the environment," she said. "If environmental problems are ignored in the process of development, economic development will be severely hampered." **(EuroBiz 2004)**

This pressure tends to be reinforced by the evolution of domestic politics linked

to high speed and broad based economic growth in China. Chief among these is the emergence of an educated urban middle class and democratization. Concerns for the environment rose, increase particularly within the emerging urban middle class. In response to deteriorating local environments, there is considerable evidence that individuals, communities and civil society groups in China are successfully pressing for local remedies.

The large urban middle class that resulted from the rapid economic growth in China facilitated a clamouring for more political freedoms. While initially focused on resolving local environmental problems, these protest movements over time developed into national environmental NGOs that built substantial membership bases, undertook studies, published results, lobbied local government officials, legislatures and executives and supported particular candidates and parties for political office.**(Tang and Tang, 1999)**

Under such a circumstance, Chinese leadership has realized that continuing this unsustainable model of development is simply not possible. As a result, there is now substantial evidence in China that political leaders and academia who used to advocate that economic growth is a universal truth are now voicing concerns that they may not be doing enough to improve the environment **(He 2000).** Senior officials, such as Qu Geping, leader of the National People"s Congress, have long stated that economic development may have to be restrained in some respects in the interest of environmental protection **(Ma 2002).**

In order to have a sustainable development, Chinese leadership urges to create an alternative to current development models. This alternative must enable social and political stability in a time of economic dislocation and growing expectations. As Pan Yue argued that the only real solution was a fundamental restructuring of China's growth ethos. The emphasis, he said, needs to be on

sustainable development, tackling the massive amounts of waste created by Chinese industry, developing renewable energy sources, and promoting recycling **(Economy 2004)**.

4.3 Regional implication

4.3.1 Regional characteristic

China"s western region occupies 66% of the country"s territory and holds 33% of its population. Although containing rich natural resources, especially mineral resources, this region belongs to arid and semi-arid zone with severe water scarcity. The annual precipitation in this region is about 400-800 mm, in northwestern inland, only 100-200 mm. The eroded lands in the west already account for 80 % of the country"s total, namely about 2,800,000 square kilometers, and no end is in sight. Moreover, the desertificated lands in the west increased by more than 3,000 square kilometers annually. In several western provinces like Qinghai and Xinjiang, forest coverage rate is even less than 1 %.

Among all the great achievements attained by china in the two decades after it embarked on economic reform and opening up, the most remarkable are the tremendous changes brought about to China"s rural areas by the rapid and sustained economic growth, which is most noticeably marked by the alleviation of poverty in the rural areas. In as little as six years, from 1978 to 1984, China"s poverty stricken population decreased from 250 million to 125 million and the incidence of poverty was reduced by half, from 30.7% to 14.8%. By 2000, the poverty-stricken population had dropped to 30 million, while the incidence of poverty declined to less than 3% **(Chen 2004)**. Despite such a success, the distribution of the remaining poverty-stricken population has become more concentrated in China"s western regions, especially the ecologically vulnerable

areas **(Tang 2005).**

In such ecologically vulnerable areas with adverse geographic conditions, the impoverished people have to make a living within the constraints of scarce natural resources. The problem of excessive exploitation is always precipitated by their efforts to lift themselves from poverty, which is undoubtedly the most important factor contributing to the deterioration of eco-environment in these areas. The close interrelation between eco-environment deterioration and poverty is also evidenced by the fact that the former, in return, furthers the worsening of the living conditions of the poverty-stricken population. Although, in general, the vicious cycle of "poverty-environment deterioration" has been brought under initial control, western region's environmental situation is still severe. Such a vicious cycle of poverty and environment deterioration still exists, especially widely in the impoverished western areas, resulting in a heavy toll of the country.

As a mountainous country, China has mountains and plateaus accounting for two thirds of its total area. Topographically, the western region is featured by most of the country's mountains, plateaus, deserts, apteriums, glaciers and areas permanently covered by snow. More than eighty percent of the impoverished counties of the western region find themselves located in one of these natural circumstances. Bad natural conditions render the poverty rate of the western region much higher than that of the central and eastern regions. **(Fu 2005)**

The "impoverished counties" are those counties to which the central government plans to give special support for poverty alleviation. According to the statistics of Poverty-Alleviation Office under the State Council, among the 592 counties defined in 1994 as "impoverished", 105 were in the eastern region, 180 in the central region, and 307 in the western region, respectively accounting

for 18%, 30% and 52% of the total. Of the over 70 million impoverished population calculated by the State Statistics Bureau, 13.85 million are in the eatern region, 20.3 million in the central region and 35.91 million in the western region, respectively representing 19.8%, 29% and 51.3% of the total impoverished population. In contrast, in 1995, the population of the western region was only 344 million, accounting for only 28.6% of China's total population. **(Fu 2005)**

The relatively impoverished population refers to the bottom 20% of rural population by income or the rural population whose income is 50% lower than the nationwide per capita rural income. By calculation in accordance with this definition, between 1994 to 1996, there were 150 to 180 million relatively impoverished persons in China's rural area **(Fu 2005)**. The western region is not only the area where the absolutely impoverished population concentrates, but also the area where the relatively impoverished population is distributed **(see table 1).**

			Farmers with per capital net income			
Type			Below 500 yuan	Below 500-800 yuan	Below 800-1000 yuan	Below 1000 yuan
Relatively Impoverished	Population (million)	East Central West Total	0.00 0.23 11.49 11.72	0.24 8.71 51.52 60.47	0.93 15.79 50.55 67.27	1.17 24.73 113.56 139.46
	Share of national total	East Central West	0.00 1.92 98.08	0.39 14.41 85.20	1.38 23.48 75.14	0.84 17.73 81.43

Low-income counties	Number	East Central West Total	0 1 44 45	2 31 206 239	5 65 148 218	7 97 398 502
	Share of national total	East Central West	0.00 2.22 97.98	0.84 12.97 86.19	2.29 29.82 67.89	1.39 19.32 29.29

Table 1: The distribution of the Relatively Impoverished Population and Low-income counties among the Eastern, Central and Western Regions

Source: **Chen (2004)**

4.2.2 Need for sustainable development

China"s environment problems could be divided into two categories: One is environment destruction related to poverty which is generated by agricultural activities, e.g., reduction of forest, destruction of vegetation, erosion of water and soil and desertification, etc.; The other is the emission of pollutants in the process of industrialization or urbanization, e.g., waste gas, waste water, solid wastes and sound pollution, etc. In China, these two kinds of environment destruction not only exist simultaneously but also have mutual bearing on each other, thus yielding multiple pressures on China"s environment.

In case of the western region, it should be said that both problems are very serious, with the former being more acute due to its regional characteristic. Given that the western region is located in the upper reaches of China"s major rivers, water and soil erosion and land desertification are becoming increasingly worse, posing a severe threat to the development of the central and eastern regions, which are located in the middle and lower reaches of these rivers. This

constitutes a major threat to the living conditions for the Chinese people as a whole.

Poverty was linked with environmental degradation well before Brundtland made it ´respectable" to do so, for instance by George **(1976)**. As Sen **(1981)** put it, it was not there was insufficient food; it was a loss of entitlement to good land to grow it on which was crucial. In China"s western region, most of the inhabitable areas, the major destructive factor of the ecological balance is caused by human presence. Other kinds of ´´bad land"" were formed by unreasonable human behaviors such as the destructive logging of forests, overgrazing of pastures, and inadequate farming techniques. These regions are generally densely populated, and the people make a living at the risk of destroying the environment.

Research indicates that, in the western region, eco-environment deterioration and poverty is highly interrelated with each other **(Chen 2004)**. This could be discerned from the typical regional characteristics of the distribution of China"s poverty population. For the 592 impoverished counties defined by the State Council in the poverty-alleviation taskforce program, eco-environment deterioration and lack of resources are the leading causes of poverty **(Chen 2004)**. As for China"s six major impoverished areas, albeit not completely disadvantage in geographical location and climate, most of them are located in China"s ecologically vulnerable areas. In these areas, the natural environment changes frequently and dramatically, the ecological system"s responding capacity is relatively weak, and the environment deterioration is quite universal. In Gansu, Shanxi and Guangxi, respectively 73%, 76% and 76% of their impoverished counties are located in the ecological vulnerable areas **(Chen 2004)**. This finding has two implications. On the one hand, bad eco-environmental conditions and lack of resources constitute the leading cause

for poverty; on the other hand, poverty exacerbates the deterioration of the eco-environment. Poor people are more vulnerable to the deterioration of ecology and the depletion of the natural resource. If the problem of poverty in the western region, those caused by ecological vulnerability in particular, could not be effectively addressed, the claimed ""great readjustment"", ""great restoration"" and ""great protection"" of the eco-environment in the region can only be given lip service.

In history, former Chinese leadership had also tried to develop China"s western region. The first time was during Deng Xiaoping"s Agricultural Reform, the second time was during the Market Economy Reform in 1990s. But these efforts were not successful. **(Zhou 2002)** Some cases, such as Tarim Basin ecological degradation and HuangQi County resource depletion **(see appendix 1),** have illustrated that there does exist a loop involving the poverty causing ecological degradation and resource depletion, and ecological degradation and resource degradation in turn causing poverty in western China. Therefore, especially for a region which depends very much on its eco-environment, the neoclassical economic development approach often leads to disaster. Joshua Muldavin **(2000)**, who has done extensive on-the-ground research in China"s western rural areas, presents a more sceptical view. He argues that changing socioeconomic structure has resulted in great disparties of wealth and poverty, driving some impoverished people to commit ´´desperate ecocide"".

The fragile ecology in the west has resulted in more frequent natural disasters in recent years. The Yangtze River often floods, the lower reach of Yellow River is short of water with increasing frequency and the sand storms become more devastating. These phenomena make treating and protecting the ecological environment the priority in the western region development program.

Why ecological sustainability comes to the fore

If the development program in western region is carried out without a sustainable view, bur solely rely on market progress and economic growth, the effort will be short-lived and will destroy the ecological balance and the long-term economic perspective.

Since China is at an early stage of this massive program to develop the western region, it is wise to pay attention to an ancient Chinese proverb: ´to know the road ahead, ask those coming back". China"s western region development must draw on its own experiences from the unsustainable development in the past as well as parallel international experience to learn and avoid debacles associated with large scale economic development. The neoclassical growth-mania development style has had huge negative impacts on both social and environment stability in the past. It is crucial that Chinese leadership understand the constraints of fragile western environments and respects the natural capital of the region"s inhabitants. It is expected that the western region development program can play a vital role in restoring China"s ecological balance, especially in controlling soil erosion and desertification.

5 Conclusion

The main aim of this report is to investigate why has Chinese leadership put ecological sustainability as the central task in China"s western region development program.

In Chapter 3, the relationship between economic growth and the environment has been discussed. Since economic growth use of many essential resources and generation of many kinds of pollutants have already surpassed the rates that are physically sustainable. Therefore, in order to achieve a sustainable development, a comprehensive revision of policies and practices is essential. Otherwise, it will be impossible to maintain perpetuate growth in material consumption and population. The transition to a sustainable society requires a careful balance between long-term and short-term goals and an emphasis on sufficiency, equity and quality of life rather than on quantity of output. It requires more than productivity and more than technology; it also requires maturity, compassion and wisdom **(Meadow et.al. 1992).** An ecologically sustainable society could be much more desirable than a society that tries to solve its problems by constant expansion.

In Chapter 4, three factors have been investigated in order to test my hypothesis and eventually answer the research question.

First of all, Sustainable development has been the central concern of world at large. International environmental agreements, addressing external effects both on the global commons and within another country"s frontiers, have increased in number and entered into force more rapidly since UNCHE and UNCED. With over one-fifth of the world"s population and an increasingly important role in global politics, Chinese leadership must be considered seriously in any attempt

to address sustainable development. Guaranteeing ecological sustainability is the deepest purpose of any economy. Therefore, Chinese leadership put ecological sustainability as the central task of western region development is a responding to the pressure of seeking sustainable development and environmental protection in an international context.

Secondly, the growing concern of sustainable development in a domestic context has a major impact on Chinese leadership's attitude on environment. Chinese leadership is now realizing that economies driven by unsustainable material consumption do not achieve a sustainable economic development. Historical experience has demonstrated that the problem in the past was closely related with the destruction of the environment. The prosperity of China can not be achieved without a sustainable eco-environment. However, after 25 years of rapid economic growth in China's eastern region, the environment has been drastically transformed. It appears that the neoclassical economic growth approach applied in China's eastern region has failed to provide the conditions necessary to maintain economic growth**.** The development model which applied in eastern region development can not be used in western region development. Therefore, Chinese leadership put ecological sustainability as the central task of western region development is a responding to the pressure of pursuing sustainable development in a domestic context.

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At last, China's western region has it special regional characteristic, the western region development plan must take this characteristic into account. Huge impoverished population and vulnerable ecology can not afford the destruction of exploitive economic growth. The relationship between ecological and economic system can not be understood as two separate realms. In the long run, the program of western region development can not progress without taking into consideration the carrying capacity of nature. Incorporating and understanding

of economic growth, ecological limits, sustainability is a basic theoretical necessity to move beyond conventional development thoughts, and foster the rebalancing of the development of China. Therefore, Chinese leadership put ecological sustainability as the central task of western region development is a responding to the requirement of sustainable development in a regional context.

Based on the understanding above, now I can draw my conclusion that Chinese leadership put ecological sustainability as the central task of western region development is a responding to the requirement of sustainable development.

6 Perspective

6.1 Difficulty

Since Chinese leadership has listed the betterment of the ecological system as the major task in its western development strategy. **(PD, 06 September 2001)**. The State Council promulgated the ´´Construction Plan for Western Region"s Ecological Environment"". The plan worked out short-term (from present to 2010), mid-term (from 2011 to 2030) and long-term (from 2031 to 2050) goals for the eco-environment construction in Western region **(SDPC AND OLGWRDSC, 2002)**. According to the plan, by the year 2010, man-made erosion of water and soil must be brought under control, the expansion of desert must be curbed, 600,000 square km of soil erosion and 22 million hectares of deserted land must be treated, and 5 million hectares of land must be returned to forest; By 2030, the western region"s eco-environmental situation must be improved significantly, so that 60% of water and soil erosion that are suitable for control will be controlled to different degrees, 40 million hectares of desertized land will be treated, and the area of forest be increased by 46 million hectares, thus expanding the nationwide forest coverage to 24%. By 2050, a sound ecological system that meets the requirement of sustainable development must be established **(SDPC AND OLGWRDSC, 2002)**.

In order to achieve those goals, China has already begun to speed up the ecological preservation projects in the western region. Some major measures have been adopted in respect to ecological sustainability.

For instance, the program on ´´Returning Cultivated Land to Forest and Grassland"", which began in 1999, is a measure of great significance **(Qian 2003)**. Many provinces have also put forward the "beautifying Hill and Water

Project" and "ecological Barrier Project of the Upper Waters of the Yangtze River". These efforts have gained support nationwide and praise from the international community. It is a great relief that the western region development program has been pioneered by these measures. **(Chen 2004).** The programs deal with 1.2 million of workers of forest industry and several million of farmers **(Qian 2003).**

However, cutting natural forests and growing gain in sloping fields are the sources of livelihood upon which poor local peasants depend. Logging is also the financial mainstay of local counties. The living standards of local peasants fell sharply and their livelihood was threatened. Some local counties dependent on forestry lost most of their fiscal revenues **(Li and Liu, 2000).** In Leishan,Taijiang and Jianhe counties, forestry and relevant industries took a fairly high share in the local financial revenue.

For instance, Jianhe County's fiscal revenue from the forestry and relevant industry in 1998 was 14.35 million yuan, representing 49.1% of the total fiscal revenue of the locality. Thanks to the reduction of felling quato. In 1999, the figure declined to 8.82 million yuan. Additionally, the revenue of the rural residents who mainly depend on forestry to make a living was also largely influenced. The average forestry-related revenue for a typical farmer was 311 yuan in 1998. The figure dropped to 216 yuan after the prohibition of felling**(Pen 2005)**. As a result, the incidence of poverty raised in some impoverished areas. The local industry faced difficulties in repaying debt and generating capital. Economic returns declined by a wide margin for the forestry enterprises, state-owned wood-processing enterprises, and the town and township wood-processing enterprises, many of them had to shut down.

Therefore, along with the overall protection of the natural forest and returning

land to forest and grassland, new problems have come to the fore. The core problem is how to make overall arrangement for the living of the local residents and forestry-related workers. Given that the protection of natural forest and the returning of land to forest and grassland are mostly carried out in the impoverished areas, how to help the local people to get rid of poverty at the same time, namely practising green poverty-eradication, has become an important problem. Without addressing this problem, the eco-environment construction of the western region will be unsustainable.

Peasants are not only the protectors of the environment, but also its destroyers. Once the livelihood of these peasants is threatened, some will cut woods, and destroy the forest and grass for their living. Such examples have often taken place in the past **(Qu 2003)**. For example, assisted by the UN Grain and Agricultural Organization, the Xiji county in Ningxia returned land to forest and grassland in the early 1990s and consequently the vegetation was restored several years later**(Qian 2003)**. However, a few more years later, due to the unsolved poverty problem, farmers went back again to destroy forest and grassland to grow crops. The achievements of the eco-environment construction were thus ruined. When their basic needs can not be fulfilled, farmers will return to the old personal modes of production. From research on the following-up problems after the ecological preservation project in the Dong and Miao National Autonomous Prefecture in the southeast part of Guizhou Province, a team of researchers from the Centre of Environment and Development of CASS concluded that the effectiveness of the project is rather weak **(Qian 2003).** If farmers' welfare cannot be assured, the achievements of the environment protection policy might all be lost. The loss refers to not only several years of painstaking efforts but also the imponderable environmental cost.

6.2 Perspective

In order to ensure ecological sustainability, Chinese leadership began a policy called Grain for Green in 1999. Starting with a pilot program in its initial year, officials planned to expand the program to 20 provinces by the end of 2010. **(Xu and Cao 2002)**.

The details of the policy for the program are: the central government provides farmers who return cultivated land to forest upstream of the Yangtzi River and in up and middle stream of the Yellow river with 150 kg and 100 kg of grain per mu respectively (calculated according to 1.4 yuan/kg) for 5 years (in the case of economic forest) and 8 years (in the case of ecological forest), with 20 yuan of cash for daily expense, and with 50 yuan for seeds and saplings. After 5 or 8 years, farmers must rely on forestry and grass industries for their living by harvesting woods and grass from those lands. It means farmers must be able to shift the forestry and grass industries into both the ecological carrier and the renewable goods sector **(Qian 2003)**. Since this policy has a time span, so people worry about what will happen after the governments stops providing grains for farmer who return their cultivated land to forest. **(Qian 2003)**

In order to ensure the fiscal source to support this policy, Chinese leadership called for more redistribution from the better-off in the rich eastern region to the poor in the western region **(Lin 2005).** Though economic growth and ecological improvement should be consistent goals, in China's western region suffering from both poverty and ecological vulnerability, there exist contradictions between the two goals. Poverty alleviation activity may yield economic benefits but its negative externality (ecological destruction and resource depletion) is not necessarily internalized. On the other hand, the great positive externality of an ecological improvement program is also difficult to be internalized as it usually

does not yield returns. Such a configuration results from the fact that the interests of the ecologically vulnerable areas and the ecologically benefited areas are separated from each other. The ecological sustainability in the western region is a great cause that benefits the whole country. The input is very large and the rewards emerge very slowly. Despite its importance, there are many benefits unnoticed and uncountable. Eco-environment preservation involves overall situation and benefit for more than a single village, a single county, or a single province. Therefore, those who suffer a lose from the eco-environment preservation project shall have compensation from the beneficiaries.

In 2002, in the process of implementing grain for green policy, Chinese leadership decided to eliminate the time span and get more grain from central and eastern regions to compensate for the returning of land to forest and grass in the western region, in short, fixed ecological compensation **(Lin 2005)**. Thus, this ecological compensation based Grain for Green policy has a broad sense which includes various kinds of assistance in favour of poverty eradication. The core of the assistance is to help the poverty-struck population to raise its capacity to get rid of poverty, and obtain ecological sustainability at the same time. Moreover, this ecological compensation based Grain for Green policy requires resource users and beneficiaries to pay expenses to resource owners or protectors as compensation. As this should support and encourage more responsibility in ecological preservation in the west.

The implementation of ´´grain for green‟‟ policy was a concrete step to restore the ecological balance in the western region as well as the whole China. To minimize the loss from land use changes, the trees to be planted can be fruit and other commercially valuable trees if the natural conditions are suitable. While the government provides the seedlings, the farmers are allowed to retain all the profits form planting trees and grass on cultivated land. In return, they will be

responsible for taking care of the restored forests and pastures. The policy is welcomed by most of the farmers and the implemented areas were larger than planned **(Xu and Cao 2002).** The grain-for-green project will not only reduce stockpiles of grain in the short term, but also help increase grain output in the long term by improving the environment. It will also help optimize the agricultural industry and increase farmers' incomes in the western region. In addition, the reforestation project will eventually eliminate the threat of flooding in China's longest rivers.

Since the ´´grain for green'' in large spheres, including the ones between the ecologically vulnerable areas in the upper reaches of the Yangtzi and Yellow Rivers and the ecologically benefited areas in the lower reaches, has been built up. It has afforested nearly 1 million hectares of barren land. By the end of the program in 2010, Chinese leaders plan that Grain for Green will set aside more than 13 million hectares of cropland and a total of 4.4 million hectares of the Grain for Green area are expected to be on sloped cropland of over 25 degrees

Such a trans-regional ecology-economy integration policy indicates that China's ecological preservation strategy, or even the overall strategy of west China development, was being renovated by new thinking. **(Lin 2005).** From this perspective, poverty-alleviation no longer equals the provision of subsistence goods, but becomes a part of the strategy of rendering protection to most of the ecologically vulnerable area. The western region will be no longer seen as a region with mineral, forest and natural gas resources, but a region adversely affecting China's overall eco-environment through water-soil erosion and desertification. This is a thinking of sustainable development, which is to integrate development goals and ecological economics principle into the development program. From wanton felling of natural forests to resolutely banning the felling and giving state protection for forests, from indiscriminately

destroying forest and grassland for purpose of cultivation, to returning cultivated land to forest and grassland, it shows that an ecological economics way of thinking has starting to challenging the foundation of neoclassical economics perspective, and adopting values which are consistent with a sustainable way of development.

Since Chinese government launched western development strategy, a total of 110 billion yuan (around 13.3 billion US dollars) has been invested in the ecological environment protection in Western Region **(PD, 12 June 2005).** Chinese leadership has quickened its pace of building a sustainable and environmentally-friendly society, and to promote the harmonious development of man and nature in its western region. It is expected the western region will be transformed into a prosperous and advanced new region with stable living conditions, united ethic groups, and beautiful landscape as well **(SDPC AND OLGWRDSC, 2002)**.

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8 Appendix

Case of Tarim Basin

The Tarim Basin, located in the Xinjiang Uighur Autonomous Region of northwest China. Once fostering a resplendent civilization with a unique history of the Silk Road, the Tarim River has long been know to the world as water of survival for its critical role in maintaining the oasis culture and sustaining the local economy for all the ethnic groups in South Xinjiang. Many decades ago, its farmers produced most of Xingjiang"s cotton, they also produced grains, fruits, silk, and wool.

Traditionally, peasants lived in Tarim basin have a nice and simple environmental protection consciousness, such as „human nature harmony". But this situation has been changed since the launch of Deng Xiaoping"s agriculture reforms. In order to lift themselves out of poverty, peasants became the main force who fought against heaven and earth and tried to conquer and remake nature. The ´´take grain as the key link "" (Yi Liang Wei Gang) ideology evolved into an urgent campaign to growth grain regardless of natural capacity. In order to reach a high output. Peasants were encouraged to ´´encircle the rivers, build land"" (wei he zao di), ´´encircle the lakes, build farm land"" (wei hu zao tian), ´´destroy the forest, open the waste land"" (hui lin kai huang) and even ´´squeeze land from rock peaks, get grain from rocks"" (cong shi tou fen li ji di, xiang shi tou yao liang). As a result, peasants cultivated new value orientations that include „Looking toward money in everything". Deng Xiaoping"s agriculture reforms unleashed the enthusiasm of the peasants, it is true. But it has been the enthusiasm for making money that has been unleashed, rather than the enthusiasm for beneficial agriculture practice per se. In short, it has generated a

desire to maxim short-term output, with little concern for long-run productivity. Peasants over-cultivated and over-used chemical fertilizer and pesticides in their contracted land; herdsman overgrazed in contracted pastures; peasants created farmland in the contracted waste hillsides. The only aim of these activities was to get rich actively, which not only resulted in the exhaustion of fertility in contracted land, degradation of vegetation, soil erosion and desertification in contracted grassland, but also created a serious „tragedy of the commons" in public land.

However, with the expanded agricultural production and more increased economic activities in the past, the fragile ecosystem had been seriously damaged.

Firstly, because grasslands were converted into croplands, Tarim basin started a vicious cycle of creeping desertification and sandstorm. Because forests were cut down to create agriculture land without considering the sandy soil, since last decade, the Tarim River had completely broken at the place of Daxihazi Reservoir, which is now the de facto ending point of this glorious lifeline. Currently, the 230km segment further down from Yingsu has totally dried up and the water table between Tieganlike and Alagan has dropped to 10m, well below the critical level for the survival of the poplar tree and the natural vegetation which constitutes a green shelter belt to keep No.218 National highway open and stop the adjacent two great deserts, Taklamagan and Kuluke, from merging into one.

Secondly, in order to produce more grain and get ´´well-off"", farming has become increasingly dependent upon techniques which undermine long-run environmental sustainability. The disturbing trends in the application of chemical fertilisers and pesticides has gone unabated. While the period 1978-84

saw a doubling of the application of chemical fertilisers, the period 1984-95 saw a further doubling **(China Statistical Yearbook 1996)**. The increased use of Chemical fertilisers has been accompanied by a levelling-off in the use of organic fertilisers, with implications for the long-run productivity of the soil. Plants" ability to use nutrients efficiently is reduced and crop yields decline, and to maintain those yield, the application of chemical fertilisers has to be accelerated, the textbook case of diminishing returns. Moreover, the increased use of chemical pesticides also results in toxicity to the humans directly involved in their application, toxic residues in water, soil and food, and the increased resistance of pests to pesticides.

As a result, the environmental degradation in the lower reaches has been deeply exacerbated, leaving the economy at risk and the green corridor on the verge of extinction, thus threatening the subsistence and development of the people there. Some physical symptoms of the current environmental degradation can be summed up as follows:

1 Shrunken and broken Tarim River, with the lakes dried up in lower reaches

2 Deteriorated farmland and closed highway as a result of increasing desertification and sand-dune encroachment

3 Frequent sandstorm disasters threatening the local people"s survival and subsistence

4 Degraded pasture-land and decreased live-stock carrying capacity

The environmental consequence and damage is irreversible and undermined the local economy and social stability.

Case of HuangQi County

China has formed a regional layout under which the western region explores and supplies resources and the eastern region process resources and manufactures goods. When China was a centrally planned economy, the government administrated the prices of resources and supplied them to the eastern region for processing at low cost.

By 1990, the policy of supplying the eastern region with raw materials from the western region at low prices was still an important part of policies supporting the development of the eastern region **(Zhou 2002)**. Prices for raw materials from the western region were artificially low, while prices for processed products of the eastern region were high. So the eastern and the western regions got different revenues from their different products. This is the fundamental reason why the eastern region developed faster than the west region. Despite the existence of some kind of advantageous industries in resource exploitation, the industrialization level of western region is generally still in the primary stage of development **(Qu 2003).**

After 1990s, Central government encourage local government to run resource business in a market system, and local government can decide the price of coal and the other natural resources according to market price. It was seen as an important policy to help western region poor out of poverty.

Given the geographical distribution of coal resources, which were concentrated in the west, in general a relatively poor region, mining allowed many counties which had previously been below the poverty line to become prosperous, through providing considerable employment for otherwise under-used labour.

Why ecological sustainability comes to the fore

A report on small mines in Henan province in western region showed: "Following the various high tides of the market economy, Henan's small coal mines have developed very fast. The sector was highly responsive to price stimuli: in Henan, local governments moved into coal mining in response to the rise in the price of coal from the early 1990s.

HuangQi County, in the mountainous areas of southern Henan, The local government believed that mines were an efficient way to get rich fast. Therefore local government decided to attract more capitals to develop more mines. More and more firms started to invest on coal extraction in this area. As a result, since 1990, small coal mines had been crucial in bringing prosperity to the rural population and allowing some of them to "embark on the path of leaving poverty behind and becoming rich." There was 40 percent of the total population which reached a "comfortable standard of living" (*xiaokang*) had done it on the basis of coal mining. But situation has been dramatically changed since 1996. Due to the depletion of the coal mines, many firms left HuangQi County. Lives there now are even poorer than before, many of them are lack of food and the other necessities. But it is not the only case, actually this case presents the situation which broadly exists in many other counties of China's western region.