**Chapter 3- Theories, models and approaches to rural development**

**3.1 Agriculture in the Lewis Model**

The first important event affecting development economics throughout the 1950s and 1960s was the idea developed by Lewis in 1954. William Arthur Lewis published the most influential

development economics article, “ ***Economic Development with Unlimited Supplies of Labor*** ”

at Manchester School in 1954. The article familiarized us with one of the best known early theoretical models of economic development that focused on the structural transformation of the primary subsistence economy to advanced industrial economy. In this work Lewis combined an analysis of the historical experience of developed countries with the central ideas of the classical economists to produce a broad picture of the development process. In the article Lewis presented a general equilibrium model of expansion in an economy with two sectors - a modern capitalist

exchange sector and an indigenous non-capitalist traditional sector. In his story a “***capitalist”***

***sector develops by taking surplus labor from a non-capitalist backward “subsistence” sector***.

**Some of the Underlying Assumptions of the Model**

1. ***The level of urban industrial real wage rate is constant over time and greater than the***

***subsistence income in the rural agricultural sector (i.e., 30% higher than wages in rural agricultural sector).***

 The word ‘wage’ does not necessarily mean the wage in the employer-employee framework; instead, it should be understood as an individual’s income or output share from any production. Properly speaking, it should be called ‘output share’ or ‘income share. The industrialists would have to offer higher wages to attract the workers to migrate into the cities.

This induces continuous migration of surplus labor from rural subsistence sector to the urban industrial sector and guarantees a higher quality of life for the rural labor force in the urban areas than remaining in the rural subsistent economy. That is, it gives workers an opportunity to earn higher incomes for further investment in urban sector.

***ii. The modern sector re-invests all its profit (excess of product earned over wages paid to***

***the laborers) in the economy.***

This confirms that the modern sector can expand without the need to raise or reduce the size of wage rates. The profits earned by the industrialists would be reinvested and the demand for labor would increase.

iii.  ***Supply of labor from the traditional sector to the modern sector is perfectly elastic at the***

***constant wage rate in the urban sector.***

This implies the following:

* Supply of labor to the modern sector is independent of the urban wage rate rather it

might be due to the subsistent life conditions in the traditional sector.

* The subsistent economy of the traditional sector maintains unlimited and continuous

supply of labor to the modern sector.

iv.  ***Real wage and the marginal product of labor in the competitive modern labor market***

***are equal****,*  ***(that is, W/P = MP***

This implies

***L).***

* The demand for labor in the urban sector is determined at the point where real wage

equal to marginal product of labor.

* Optimal level of employment in the modern sector is by labor’s declining marginal

product in the modern sector, assuming the supply of capital is fixed.

1. ***The urban industrial sector maintains proportional rate of labor absorption (creation of***

***new employment opportunity) and capital accumulation***

Labor force migrated from rural to urban sector always gets employment

opportunity in the modern sector.

The larger the rate of economic expansion in the urban sector, the higher the rate of

labor transfer from rural to urban economies.

***vi. Marginal product of labor in the traditional rural sector is zero or negative until labor***

***transfer from rural to urban areas stops***

* Labor leaving the rural areas are surplus and they would have virtually

no impact on agricultural output in the rural area.

* The amount of food available to the remaining villagers in the rural area

would increase as the same amount of food could be shared among fewer people.

**Illustration of the Model**

The focus of Lewis model is both on the process of labor transfer from rural agrarian to urban industrial and on the growth of output and employment in the modern urban-industrial sector. Lewis suggested that the modern industrial sector would attract workers from the rural areas. The analysis of the model was based on the assumption that many LDCs had dual economies with both a traditional agricultural sector and a modern industrial sector. The traditional agricultural sector was assumed to be of a subsistence nature characterized by low productivity, low levels of income, low savings and considerable underemployment. The subsistence traditional sector was also pictured as the ‘self-employment sector’. In contrary, the capitalist industrial sector is characterized by its use of reproducible capital, hiring of labor, and its sale of output for profit. Moreover, the capitalist industrial sector was assumed to be technologically advanced with high levels of investment operating in an urban environment.

According to the model, industrial firms, whether private or publicly owned could offer wages that would guarantee a higher quality of life for laborers than they could remain in the rural areas. As the level of labor productivity was so low in traditional agriculture, people leaving the rural areas would have virtually no impact on agricultural output. Indeed, the amount of food available to the remaining villagers would increase as the same amount of food could be shared among fewer people. This might generate a surplus which could then be sold for generating more income for people remaining in the rural areas.

Furthermore, according to the model, those laborers who move away from the villages to the towns would earn increased incomes and this crucially generates more savings. Accordingly, the lack of development is due to a lack of savings and investment and the key to development is to increase savings and investment. Therefore, Lewis saw the existence of the modern industrial sector as essential if this was to happen and rural-urban migration of labor from the poor rural areas to the relatively richer industrial urban areas gives workers an opportunity to earn higher incomes and crucially make them to save more funds for investment. That is, a growing industrial sector requiring labor provides the incomes that could be spent and saved. This would in itself generate demand and also provide funds for investment. Income generated by the industrial sector was trickling down throughout the economy.

**The Human Capital Model of Development**

This model emphasizes the importance of human capital investment in the process of economic and social development. By human capital, we mean acquired mental and physical ability through education, training, health care, and pursuit of some spiritual methods. The acquisition of human capital is largely through the investment of human effort and money. The simplest and most important of this type of model is a schooling model, which relates economic development to schooling. It was Theodore Schultz, who elaborated the concept of human capital, and explicitly considered the investment in human capital as an important determinant of economic development. Subsequently, quite a few other scholars got interested in the economics of human capital, especially the economics of education, and a large number of studies were conducted on the subject. The model considers the totality of human potential, and emphasizes the need to harness it for the good of the people. It respects people’s culture and religion, and social values and structures.

The human capital approach to rural development is based on the following two assumptions.

1. Human physical and mental capabilities are partly inherited and partly acquired, and they vary from individual to individual.
2. Human capital directly contributes to development through its positive effect on productivity, and through reduction in resistance to the diffusion of new technologies in the economy, especially in the rural sector.

Thus this model shifts the emphasis from physical capital formation to human capital formation and from industrial development to rural development, as a basis for overall development. This model seems most appropriate for labor-surplus developing countries; where a lot of underdeveloped human capital resources having high potential for development exist. Besides, human resources are renewable, and hence inexhaustible. Therefore, human capital can be substituted for exhaustible non-renewable physical capital in the process of development, and thus relax the constraint on development imposed by inadequacy of physical capital to a large extent. As a matter of fact, strategies for development of the tertiary sector, which is the fastest growing sector all over the world, requires skilled, experienced, and innovative human resources for their success. Human resource development through nutrition, health care, appropriate education, training and empowerment deserves the highest priority now.

## Unimodal and Bimodal Approaches to Rural Development

Unimodal and bimodal rural development approaches are defined in terms of the path selected for development of agriculture, for agriculture is the primary and core sector predominantly determining the economic and social development of the rural sector (rural development) in many developing countries today. The central axes of the debate by the two approaches are

* the argument for the necessity of the development of large-scale units of farm production (bimodal or capitalist approach to agricultural development) and
* the argument for agricultural transformation on the basis of small-scale peasant farms (unimodal or neo-populist approach).

**Unimodal approach** is based on conceptual perspective of specific peasant economy. It argues that small producers who are not separated form their means of production and who survives in the sense of household producers retain a degree of control over land and family labor in spite of secular differentiation that may take place in the economy due to commoditization and commercialization. The strategy aims at the progressive modernization of the entire agriculture sector (e.g. Japan and Taiwan).

The approach's major strategy is maximum mobilization of labor and land resources of the developing countries. The approach, cognizant of the fact that agriculture is subject to demand constraints in relation to non-agricultural sectors and the resulting purchasing power constraint to use of purchased inputs produced domestically or imported, underscores the importance of rapid technical change, particularly divisible innovations that leads to the wide spread increase in the productivity of land and labor.

The success of individual farm units in allocating resources so as to minimize costs is an essential ingredient of efficient agricultural strategy. It is however the nature of technical innovations and their diffusion among farmers that is decisive in minimizing the cost of the sector-wide expansion of farm output and in determining the pattern of development.

**Bimodal approach** is a crash modernization strategy that concentrates resources in highly commercialized sub-sector, with the resulting development pattern based on a dualistic size structure of farm units (e.g. Mexico, Colombia). The approach is based on differentiation theoretical perspective which asserts that commoditization and commercialization process inevitably generate differentiation in agrarian societies whereby rural producers are set apart into distinct classes (agricultural capitalist, small farmer, land less agricultural employee) and producing a dual size structure of farm units (Harriss, 1982).

These two agricultural development paths are different in their contribution to achieve the three major objectives of an agricultural development strategy. The objectives are:

* 1. expansion of farm output and income
	2. advancing structural transformation, (raising the welfare of the farm population and
	3. fostering changes in rural attitudes and behavior that will have beneficial effects on the process of rural development and modernization.

The embraced path of agricultural development needs to facilitate the fulfillment of the objectives and policies and components of the agricultural strategy chosen. Any agricultural strategy1 would comprise

* programs of institution-building related to such activities as agricultural research, rural education and farmer training,
* programs of investment in infrastructure, including irrigation and drainage facilities and rural roads,
* programs to improve product marketing and the distribution of inputs and
* policies related to prices, taxation, and land tenure.

A strategy's emphasis need to be on action to change the production possibilities available to farmers by modifying their institutional, technical, and economic environment. An underlying premise is that decentralized decision making by individual producers in agriculture, and a price mechanism performs a critical function in harmonizing decentralized decision and in harnessing the powerful motive of profit. In this connection, government may need to adopt policies to make prices reflect more adequately the social costs and benefits of using resources in different types of productive activities.

A suitable approach of a strategy is a simultaneous consideration of the objectives to be furthered and the means (policies and programs) by which these objectives are to be attained. Choice of objectives and means of a strategy need to be guided by explicit recognition of certain constraints that can only be gradually eliminated, especially those imposed by structures and demographic situation. Multiple objectives of agricultural development are the choice criteria of an agricultural development strategy. The three major objectives indicated above are elaborated below.

1. ***Expansion of farm output and income:***There is a need to achieve a rate and pattern of output expansion in agriculture that promote overall economic growth and structural transformation taking full advantages of positive interactions between agriculture and other sectors. This objective encompasses the contributions of agriculture to development -
	1. providing increased surplus of food and raw materials to meet the needs of the expanding non- farm sectors,
	2. earning foreign exchange through production for export, and
	3. providing a net flow of capital to finance a considerable part of the investment requirements for infrastructure and industrial growth.

The growth of a marketable surplus of farm products, expansion of foreign exchange earnings and increased availability of resources for capital formation are necessary conditions for the development of a diversified modern economy. At the same time the growth of farm cash income associated with structural transformation means increased rural demand for inputs and consumer goods that can provide important stimulus to domestic industry. The strength of that stimulus and the associated feedback effects will be strongly influenced, however, by the composition of a rural demand.

This expansion of farm cash income generates demand for simple tools and consumer goods thus fostering the evolutionary growth of domestic manufacturing that lead to the strengthening and diffusion of entrepreneurial and technical competence.

1. ***Broad-based improvement of the welfare of the rural population****:* This objective is important simply because such a large fraction of the population of developing countries is destined to live and die in farming sector and society. This is achieved through altering the predominantly agrarian structure of the economy. The possibility of enlarging the average income of farm households is determined mainly by the rate and character of the structural transformation, as manifested in the decline of the relative, eventually the absolute size of the farm work force and the associated growth of commercial demand for agricultural products.

The inequality in income distribution is a conspicuous feature of most less developed countries. This inequality will either be reduced or exacerbated depending whether the demand for labor increases more or less rapidly than the country's workforce. On the other hand, the extent to which expansion of farm output leads to widespread increases in income-earning opportunities depend on the development and diffusion of technological innovations. Certain dimension of welfare can be furthered by direct action through government programs like rural works and public health and related activities.

1. ***Fostering a pattern of agricultural development*** that will have a favorable impact on social development (modernization as a result of inducing changes in rural attitudes, behavior and institutions). Development of social institutions is a feature of structural transformation (e.g. agricultural research centers, educational facilities for farmers, training, private, public or cooperative business organizations for credit and input distribution and product marketing; irrigation associations, and other groups).

Institutional progress is significant in countries undertaking unimodal strategy of agricultural development. Thus interactions between technical and economic change at the farm level and institutional, attitudinal, and behavioral change merit attention on assessing the differential effects of alternative strategies.

Broad participation of the farm population in improved income-earnings opportunities will influence the rural power structure and political institutions. This has implications with respect to political and financial support for rural schools and other institutions to serve fanning communities. Besides, conscious action to limit family size will take hold more readily if rural households are actively involved in a process of economic and technical change whether as owner cultivator or as tenants, rather than being relegated to a surplus population- supporting sector with slight opportunity to better their conditions. An acceptable agricultural strategy therefore needs to be assessed in terms of the objectives and features of agricultural development desired.

The central element of a unimodal strategy is the development and diffusion of highly divisible innovations that promote output expansion within an agrarian structure made up of operational units relatively equal in size and necessarily small because of large number of farm holdings relative to cultivated land. Progressive modernization based on widespread use of a sequence of technological innovations compatible with the constraints imposed by structural-demographic characteristics makes it possible to exploit the large potential that exists or augmenting the productivity of the agricultural sector's internal resources of labor and land.

Bimodal or capitalist agriculture can develop as landlord capitalism (capitalism from above) or as peasant capitalism (capitalism from below) or as a mixture of both forms. Such agrarian change in developing countries is the development of a differentiated peasantry, from which a class of capitalist farmers and one of the agricultural wage laborers can emerge. The agrarian question is however not solved from the point of view of the whole social formation until a regular surplus on reasonable terms (acquired through market, taxation or savings) is made available to enable industrialization to proceed and capitalism to develop outside agriculture. This will break then the political power of the rich peasantry.

**3.6. Models of Agricultural Development**

#### **The Conservation Model**

The conservation model of agricultural development evolved from the advances in crop and livestock husbandry and the concepts of soil exhaustion suggested by soil scientists. This theory was reinforced by the concept of diminishing returns to labor and capital applied to land and the traditions of ethical, aesthetic and philosophical naturalism. The new husbandry permitted the intensification of integrated crop-livestock production through the recycling of plant nutrient and animal manures to maintain soil fertility. Advances in technology were accompanied by the consolidation and enclosure of farms and by investments in land management; thus the inputs used in this conservation system of farming were largely supplied by the agricultural sector itself.

The *nature and principle of soil and plant nutrition* led to a doctrine of soil exhaustion which states that the danger of soil exhaustion (depletion) was so great that any permanent system of agriculture must provide for the complete restoration to the soil of all the elements removed by the crop. And it was also extended to include the maintenance of the mineral content of the soil.

Summarized in economic terms, the doctrine asserts that natural resources are scarce, that the scarcity increases with economic growth and that resources scarcity threatens to impair levels of living and economic growth.

**The diffusion model**

The diffusion of better husbandry practices was a major source of productivity growth even in pre-modern societies. The diffusion of crops and animals from the new world to the old potatoes, maize, cassava, rubber and from the old world to the new sugar, wheat, and domestic livestock was an important byproduct of the voyages of discovery and trade from the fifteenth to the nineteenth centuries.

Diffusion of crops and animals had historically proceeded as a byproduct of trade, discovery and migration. The diffusion of maize to the Old World is an example. Within a decade after Columbus had first displayed Indian corn (maize) at the Spanish court, it was being grown in the Po Valley in Northern Italy. In that relatively short time, it had diffused from Spain and across North Africa to Turkey and was brought to the Po Valley by Venetian traders. By the latter part of the nineteenth century, all major agricultural nations were actively engaged in organized crop exploration and introduction. The famous trip of Captain Bligh to the South Pacific, described' in the book and the film, Mutiny on the Bounty, was undertaken as a crop exploration mission. His assignment was to bring back breadfruit seedlings and wild sugar-cane cultivars. But his crew was more attracted to brown girls. The botanical gardens established by the great colonial powers were primarily meant to serve as crop introduction stations. The diffusion of rubber from Brazil to Southeast Asia illustrates their role. When the process of vulcanization was invented making it possible to produce such desirable products as rubber boots, raincoats and tyres the price of natural rubber, produced from wild trees in the Amazon basin of Brazil, skyrocketed. Brazil made it illegal to export either rubber seeds or rubber plants. The British sent a botanical expedition to Brazil with the ostensible purpose of collecting plants that had medicinal value. But they also brought back rubber seeds. The seeds were first sprouted at the Royal Botanic Gardens at Kew. The seedlings were then transferred to the botanical gardens at Kandy (Sri Lanka) and in Singapore. The Kandy seedlings died but the Singapore seedlings lived and became the foundation stock of the rubber industry in Southeast Asia. In the early post-World-War-II period, the diffusion model provided the intellectual foundation for technical assistance to developing countries. President Truman talked about American "knowhow — showhow." The naive diffusion-approach drew on the empirical observation of substantial differences in land and labour productivity among farmers and regions. The route to agricultural development in this view was through more effective dissemination of technical knowledge and the narrowing of productivity differences. The diffusion model has provided the major intellectual foundation of much of the research and extension effort in farm management and production economics since the emergence, in the later years of the nineteenth century, of agricultural economics and rural sociology as separate subdisciplines linking the agricultural and the social sciences. Developments leading to the establishment of active programmes of farm management research and extension occurred at a time when experiment station research was making only a modest contribution to agricultural productivity growth. A further contribution to the effective diffusion of known technology was provided by rural sociologists' research on the diffusion process. Models were developed emphasizing the relationship between diffusion rates and the personality characteristics and educational accomplishments of farm operators. Insights into the dynamics of the diffusion process, when coupled with the observation of wide agricultural productivity gaps among developed and less developed countries and a presumption of inefficient resource-allocation among "irrational, tradition-bound" peasants, produced an extension or diffusion bias in the choice of agricultural development strategy in many LDCs during the 1950s. During the 1960s, the limitations of the diffusion-of-technology-transfer model as a foundation for the design of agricultural development policies became increasingly apparent as technical assistance and rural development programme based explicitly or implicitly on this model — failed to generate either rapid modernization of traditional farms and communities or rapid growth in agricultural output. There were very few opportunities to generate large productivity gains through the transfer of technology from one agroclimatic zone to another, or even among regions in the same agroclimatic zone. The pipeline was empty!

#### **The High-Payoff Input Model**

#### The inadequacy of policies based on the conservation, urban-industrial impact, and diffusion models led, in the 1960s, to a new viewpoint: the key to transforming a traditional agricultural sector into a productive source of economic growth in investment, designed to make modern, high-payoff inputs available to farmers in poor countries. Peasants in traditional agricultural systems were viewed as rational, efficient resource-allocators.

#### In Transforming Traditional Agriculture, T. W. Schultz insisted that peasants in traditional societies remained poor because there were only limited technical and economic opportunities to which they could respond. The new, high-payoff inputs were classified into three categories according to (i) the capacity of public- and private-sector research institutions to produce new technical knowledge; (ii) the capacity of the industrial sector to develop, produce, and market new technical inputs; and (iii) the capacity of farmers to acquire new knowledge and use new inputs effectively.

#### The enthusiasm with which the high-payoff input model has been accepted and translated into economic doctrine has been due in part to the proliferation of studies reporting high rates of return to public investment in agricultural research. It was also due to the success of efforts to develop new, high-productivity grain varieties suitable for the tropics. New, high-yielding wheat varieties were developed in Mexico beginning in the 1950s, and new, high-yielding rice varieties were developed in the Philippines in the 1960s. These varieties were highly responsive to industrial inputs such as fertilizer and other chemicals and to more effective soil and water management. The high returns associated with the adoption of the new varieties and the associated technical inputs and management practices have led to a rapid growth in investment in agricultural research and to the development and adoption of the new and more productive crop varieties by farmers in a number of countries in Asia, Africa, and Latin America.

#### But the acceptance of the high-payoff input model has been incomplete. Many countries have not yet freed their private sector to produce and market the new technical inputs which enhance productivity. Those are the functions which the public sector typically performs poorly. The constraints placed on market development continue to deprive farmers and consumers of gains from the new technology that is becoming available.

#### There has been even greater reluctance, in a number of developing countries, to accept the implication of the high-input model for the schooling of farm people. The intellectuals and planners in many developing countries find it difficult to understand the importance, for agricultural development, of a literate and a numerate peasantry. When advances in agricultural technology occurred slowly, the apprenticeship mode of learning, without formal schooling, from family and village elders was adequate. But when a continuous stream of new biological and mechanical technology becomes available, the returns to the acquisition of new skills in production and marketing are driven up. It becomes important not only to accept but also to be able to adapt or reject the new "packages" of practices and inputs being recommended by research and extension services. Agricultural extension services themselves must be able to advance beyond simply recommending a package of practices or delivering technological and managerial messages to farmers. They must advance from teaching practices to teaching principles

####  **The High Pay-Off Input Model**

The absence of a body of agricultural techniques that could be readily diffused from the high productivity to the low productivity countries and the existence of significant disequilibrium in the allocation of resources among progressive and lagging farmers led to the emergence of a new perspective that agricultural technique is highly location specific and that techniques developed in advanced countries are not directly transferable to less developed countries with different climate and resource endowment.

In Schultz's opinion, the key to transforming a tradition agricultural sector into a productive source of growth is investment to make modern high pay-off input available to farmers in poor countries. Peasants in traditional agriculture are rational, efficient resource allocators and they remain poor because of limited technical and economic opportunities. This implies mainly three types of relatively high productivity investment for agricultural development: -

* In the capacity of agricultural experiment stations to produce new technical knowledge,
* In the capacity of industrial sector to develop, produce and market new technical inputs, &
* In the capacity of farmers to use modern agricultural factors effectively.

The high-payoff input model has been accepted and translated widely into an economic doctrine due to the successful results of the efforts to develop high-yielding modern grain varieties suitable for tropics. The varieties were highly responsive to industrial inputs, such as fertilizers and other chemicals, and to more effective soil and water management. The significance of the high pay-off model is that policies based on the model appear capable of generating a sufficiently high rate of agricultural growth to provide a basis for overall economic development consistent with modern population and income growth requirements and thus the model was heralded as a ‘green revolution’. As interpreted generally,

the model is sufficient to embrace the central concepts of the conservation, location, and diffusion models of agricultural development.

 Although the model was criticized for the major problems of inapplicability at the micro level, it is implicitly applied in Ethiopia by establishing the Rural Technology Center in order to produce and introduce new inputs and equipment designed for improved agricultural production and productivity but practically unable to be fully effective. The Rural Technology Centers (started since long during the then Dergue regime and functional still) have dimensions of diffusion model as well. In fact, the dissemination of materials produced/installed at demonstration level also failed mostly because of the activities being carried out without the participation of peasants from the very beginning.

**The Location model (Urban-Industrial impact model)**

Initially, the location model was formulated in Germany by J. H. von Thiinen to explain geographic variations in the intensity of farming stems and the productivity of labor in an industrializing society. In United States it was extended to explain the more effective performance of the input and product markets in regions of rapid urban industrial development than in regions of slower urban-industrial development. In the 1950s, interest in the location model reflected concern with the failure of agricultural resource development and price policies, adopted in the 1930s, to remove the persistent regional disparities in agricultural productivity and rural incomes in the United States.

The rationale for this model was developed in terms of more effective input and product markets in areas of rapid urban-industrial development. Industrial development stimulated agricultural development by expanding the demand for farm products, supplying the industrial inputs needed to improve agricultural productivity, and drawing away surplus labour from agriculture. The empirical tests of the location model have confirmed repeatedly that a strong non-farm labour market is a prerequisite for labour productivity in agriculture and improved incomes for rural people.

#### The policy implications of the location model appear to be most relevant for less developed regions of highly industrialized countries or lagging regions of the more rapidly growing LDCs. Agricultural development policies based on this model appear to be particularly inappropriate in those countries where the "pathological" growth of urban centres is a result of population pressures in rural areas running ahead of employment growth in urban areas. **The Resource Exploitation Model (frontier Model)**

According to this model, expansion in the areas of cultivated/grazed has been the main means of increasing agricultural production, exemplifying in Western history the opening of new continents such as North and South America, Australia to European settlement during 18th and 19th centuries. Similar events were also seen, though in slow pace, in Asia and Africa, and to some extent in the case of Ethiopia in Derge and EPRDF settlement issues. Population pressure resulting in the intensification of land use in the existing villages was followed by **pioneer settlement programs**, the establishment of new villages, and the opening up of forest or Jungle land to cultivation with a series of changes from Neolithic forests to shifting cultivation on bush and grassland to short fallow annual cropping.

The explanation is that surplus land and labor capacity enabled peasant producers to expand production rapidly under the stimulus of new markets opened by the reduction of transport cost. This is exemplified in the production of rice in Asian countries. In Latin America and Africa the opening up of new lands awaited the development of technologies for control pests and diseases in the tsetse fly infested plains and productivity problems of soil and incapability of maintaining fertility was a problem.

The primary concern of the scholars (staple and vent for surplus theories) were to explore the conditions by which underutilized natural resources could be exploited to generate growth in agricultural output and to identify the processes by which agricultural surplus could be mobilized to generate growth in the whole economy. In order to sustain agricultural growth it is necessary to make a transition from resource exploitation to:

* 1. Development of resource conserving or enhancing technologies such as crop rotation and manuring.
	2. Substitution of modern industrial inputs such as fertilizers for natural soil fertility
	3. Development of modern fertilizer responsive crop varieties.

**Green Revolution**

The Green Revolution is a term used to describe the transformation of agriculture in many developing nations that led to significant increases in agricultural production between the 1940s and 1960s. This transformation occurred as the result of programs of agricultural research, extension, and infrastructural development, instigated and largely

funded by the Rockefeller Foundation, along with the Ford Foundation and other major agencies.

The term ―Green Revolution‖ was first used in 1968 by the former USAID director William Gaud, who noted the spread of the new technologies and said, These and other developments in the field of agriculture contain the makings of a new revolution. The Green Revolution has had major social and ecological impacts, which have drawn intense praise and equally intense criticism.

International spread of the Green Revolution

With the experience of agricultural development judged as a success by many of the power holders involved, the Rockefeller Foundation sought to spread the Green Revolution to other nations. The Office of Special Studies in Mexico became an informal international research institution in 1959, and in 1963 it formally became CIMMYT (The International Maize and Wheat Improvement Center).

The second nation to which the Green Revolution spread was India. The Ford Foundation had a presence in the nation, and their social scientists had decided that the technological development of agriculture was important to the future of India. At the same time C.Subramaniam, the former Indian Minister of Steel and Mines, became Minister of Food and Agriculture. The Foundation and Indian government collaborated to import a huge amount of wheat seed from CIMMYT. India then began its own Green Revolution program of plant breeding, irrigation development, and financing of agrochemicals. By the late 1970s, the Green Revolution raised rice yields in India by 30 percent and brought India the vital time to curb its population growth without suffering a recurrence of the devastating famines of the 1940s.

The Rockefeller and Ford Foundation jointly established IRRI (The International Rice Research Institute) in the Philippines in 1960. HYVs (high yielding varieties) spread throughout that country, Indonesia, Pakistan, Sri Lanka, and other non-Soviet bloc

countries throughout Latin American, Asia, and North Africa. USAID became involved in subsidizing rural infrastructure development and fertilizer shipments