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**Poverty, Political Failure and the Use of Open
Access Resources in Developing Countries**

by

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Resources in Developing Countries[†]**

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Abstract

This paper begins by distinguishing open-access resources from common-property resources, the use of which is subject to communal rules. In practice, it is suggested that these cases are the outcomes of a spectrum of property rights. The standard economic theory of the use of open-access resources as developed by Western economists is outlined and ways in which it has limited applicability to developing countries are suggested. This theory does not, for example, consider the possibility that incomes in open-access situations may fall to subsistence levels, as appears to be common in developing countries. A model is presented in which the long-run equilibrium involves a subsistence level of income which may be at or near a poverty level. This seems more relevant for developing countries. It is shown that governments in developing economies may be unable to find workable policies that will extricate communities from such a poverty trap. Reasons why governments in developing countries may allow such a situation to occur are discussed. The limitations of using new technologies to increase harvesting productivity and reduce poverty are discussed. Implications of the analysis for the type of aid that developed countries should give to developing countries are specified.

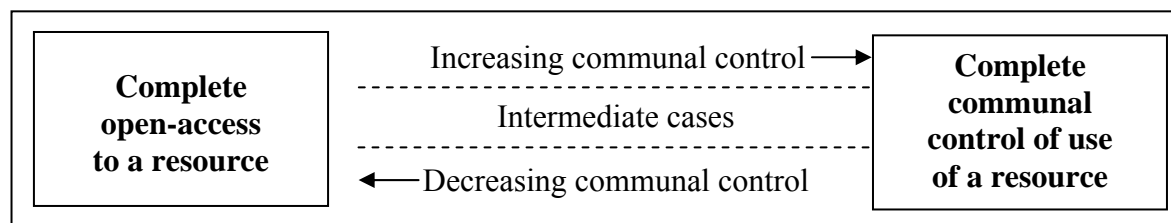
Poverty, Political Failure and the Use of Open-Access Resources in Developing Countries

1. Introduction

Open-access resources are resources which anyone is free to use without payment and the use of which is not subject to social or communal control. They have sometimes been described as common property resources (Gordon, 1954; Plourde, 1971). But nowadays this term is usually reserved to identify resources that are used subject to communal regulation or control (Tietenberg, 2003, pp.70-72, Bromley, 1991; Ostrom, 1990).

In practice, different types of property rights in natural resources form continuous rather than discrete patterns. For example, if we consider only open-access property and common property subject to communal rules, a spectrum of possibilities such as that illustrated in Figure 1 may arise. At the one extreme, is complete open-access. At the other is common property, the use of which is subject to complete communal control. In between are cases in which the use of natural resources is subject to varying degrees of communal control. For example, located just to the right of the left hand side of this spectrum in Figure 1 may be cases where open-access is restricted to those in a village, area, or region near a natural resource that is being used. For example, only villagers from an adjacent village may be allowed access to adjoining inshore coastal resources, and for them complete open access may exist. The economic consequences of such a form of property rights, however, may become similar to the extreme open-access case, particularly if the comparative numbers able to use the resources is large.

Figure 1: The extent of communal control of the use of shared resources may form a continuous spectrum



Open access to many natural resources occurs in developing countries. Open-access is frequent in the capture fisheries, particularly in the artisanal fisheries, in developing countries. The analysis in this paper will focus on fisheries but the analysis also has applications to the use of other open-access resources. There is a high incidence of poverty of artisanal fishermen in

developing countries and generally of families who rely on the use of open-access resources for their livelihood. This article explores why this is so, and considers why governments in developing nations fail to avert the occurrence of poverty that arises from the over exploitation of open-access resources and their helplessness in rectifying this poverty situation when it arises.

It will be argued that in developed countries, open-access to the use of natural resources does not as a rule result in poverty but that it usually does so in developing countries. Furthermore, governments in developed countries find it easier to adopt policies to reduce over exploitation of open-access natural resources than those of developing countries which may have little or no leeway to intervene so that communities escape the poverty trap arising from the over-exploitation of open-access natural resources.

The paper is developed by first outlining relevant features of the economic theory of the use of open-access resources as proposed by Western economists. It highlights limitations of this theory when applied to developing countries. Theory of the use of open-access resources that is more applicable to developing countries is then outlined, and followed by a discussion of the political problems and failures that developing countries face in regulating their use of open-access resources. This failure often results in those using open-access resources in developing countries being trapped in poverty. Furthermore, their governments, unlike those in higher income countries, lack policy options to extricate their communities from this predicament. Thus, in developing countries, a rather hopeless economic situation can emerge for those whose livelihood depends on the utilisation of open-access resources.

2. Features of the Standard Economic Theory of Use of Open-Access Resources

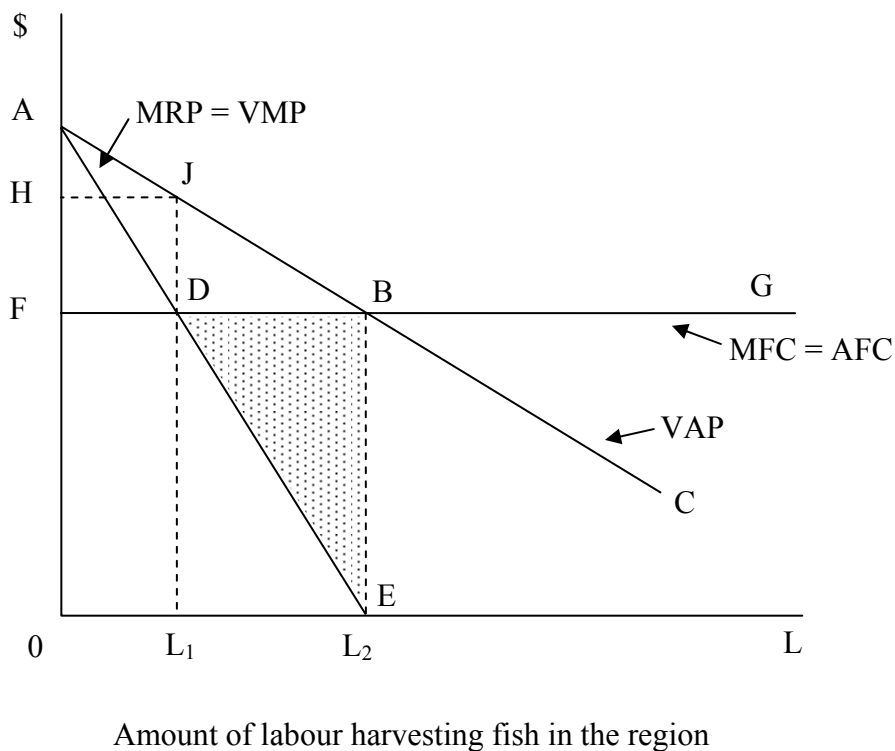
The standard economic theory of the utilisation of open-access resources assumes an economy with a well developed market system, and its exponents appear to suppose implicitly that the system has most of the features of a developed economy. The theory assumes an economy in which labour is fully employed and mobile and normally perfect competition is supposed. Thus, labour employed in an open-access industry will not have an income less than the highest income it can earn elsewhere which in developed countries is well above subsistence level.

Consequently, in studying the use of open-access resources, economists from higher income countries have not focused on poverty aspects. Rather, their attention has been on resource misallocation associated with the use of open-access resources. Although this misallocation

reduces the level of aggregate economic production, it is not likely to be a source of poverty in developed countries because labour is relatively mobile and few resources involve open-access. The main concern of Western economists has been that when open access to resources occurs a Paretian optimum is not achieved and a Kaldor-Hicks (Paretian) economic improvement is possible. This implies that all could, in principle, be better off if the use of resources could be reorganised.

The focus of this theory can be illustrated by Figure 2. It is supposed that perfect competition prevails and the price of the product being harvested is independent of the amount of the harvest in the region under consideration. Let us assume that the product being harvested is fish, although the theory is applicable to any biological open-access resource. In Figure 2, line AC represents the value of the average product of labour harvesting fish and line AE is its corresponding marginal revenue product curve. Line FG represents the marginal factor cost of labour. Under perfect competition, it is the marginal value of labour if labour is used elsewhere in the economy. The value of production in the economy will only be maximised if the marginal value of labour in fishing in this region is equal to its marginal factor cost, which also represents its marginal value when used elsewhere in the economy. Note that although labour is mentioned as the only input into the fish catch, the theory also applies if it is assumed that each unit of labour requires the use of complementary resources in fixed proportions.

Figure 2: An illustration of an economic inefficiency occurring in the use of an open-access resource in a market economy



If businesses in the industry can make greater than normal profit, others will enter this industry and more labour will be employed. For example, if the quantity L_1 of labour is in the industry, a surplus equal to the area of rectangle $FDJH$ is earned by firms in the industry. Since there is open-access, new firms will enter the industry and this entry will continue until all rent or surpluses are eliminated. This occurs when L_2 fishers are employed in the industry. Note that the ‘Western’ theory assumes that fishermen are employees of business firms rather than self-employed artisanal fishermen, as seems common in many developing countries.

When L_2 fisherman are employed in the industry, a deadweight or Kaldor-Hicks economic loss equivalent to the area of the dotted triangle DEB occurs. The marginal value of labour employed in fishing is less than its marginal (opportunity) cost (its marginal value when it is used to produce other products) if more than L_1 of labour is employed in fishing. Therefore, open-access results in a misallocation of resources – from an economic efficiency perspective, too many resources are employed in fishing when open-access occurs. The social economic loss involved is represented by the area of triangle DEB .

If private property rights could be economically established, it has been argued that the most efficient situation could be achieved. Private owners of the fishery resource would charge an amount FH on each unit of labour entering the industry and therefore, only L_1 would operate in the industry. However, private property rights cannot as a rule be economically established in such an industry. Therefore, an alternative is for the government to restrict numbers in the industry to L_1 . In principle, this might be achieved by licensing and charging an annual fee or tax of FH per unit of labour employed in the industry.

In a developed country, there would be few constraints on the implementation of this policy even if the industry is already over-expanded, for example, is in open-access equilibrium with L_2 employed in the industry. Those displaced in the industry, $L_1 - L_2$, would be able to obtain employment elsewhere in the economy and obtain a similar level of income to that previously earned in fishing. At least, this would be so in a perfectly operating economy as assumed in this theory. Even if there were some frictions involved in adjustment, governments in developed countries would be in an economic position to provide funds to assist the transition of fishers to other industries, whereas this would be unlikely in less developed countries.

Of course, the above is not the only type of economic inefficiency that can arise when there is open-access to resources. Another shortcoming is the failure of those in an open-access industry to take into account marginal user costs. Consequently, resources may be used in the present which would be more valuable socially if conserved for the future. This and other types of economic inefficiency that arise when there is open-access to resources are discussed, for example, in Tisdell (2002, Ch. 8; 2005, Ch. 6).

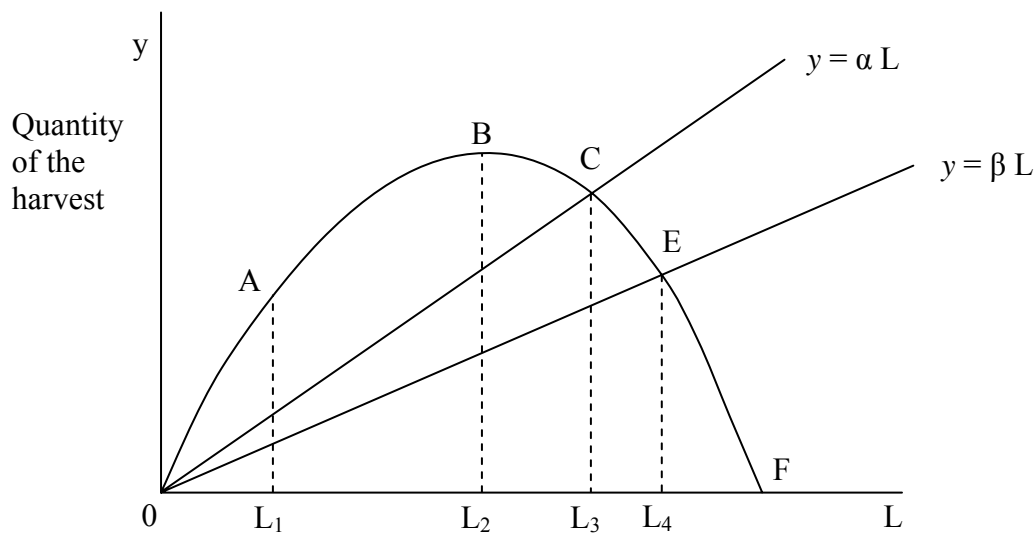
In developed countries such economic inefficiencies do not result in poverty because labour is assumed to be mobile, wages in those countries are above subsistence level, and few industries involve open-access. But in developing countries, wages are low and those displaced from use of open-access resources are hard-pressed to find employment elsewhere. In developing countries, incomes of those involved in open-access activities may fall to subsistence level and their governments may find it difficult or impossible to rectify the situation. Let us analyse this matter.

3. The Open-Access Problem in Developing Countries and the Presence of a Poverty Trap

In many developing countries, utilisation of open-access resources provides an economic opportunity for the employment of individuals who do not own significant amounts of private resources, and who are unable to find employment working for others. In the theory outlined here, it will be assumed that open-access resources are utilised directly by individuals mainly for subsistence purposes and that if income from their use is above subsistence level, this attracts others to exploit these open-access resources. Entry continues until incomes fall to subsistence level. This may occur because entrants are attracted from elsewhere in the economy, or because the Malthusian theory of population growth applies, that is, the population of those utilising the open-access resources increases when incomes are above subsistence level.

The theory can be illustrated by Figure 3. Let β represent the subsistence level of per capita income which is assumed to be a poverty level of income. This may be also interpreted as the income level per family needed for subsistence, assuming that available labour per family is proportional to family size and that the population supported is in proportion to the numbers working in the open-access industry. The line $y = \beta L$ represents the total output needed to supply a subsistence level of income for all engaged in the harvesting of the open-access resource which, for simplicity, we suppose is the stock of fish. The government would like to have a per capita income level for fishermen of an amount α indicated by the slope of line OC in Figure 3. The curve marked OABF (which is often assumed to be a quadratic function) represents the relationship between the total harvest of fish and the number of fishers .

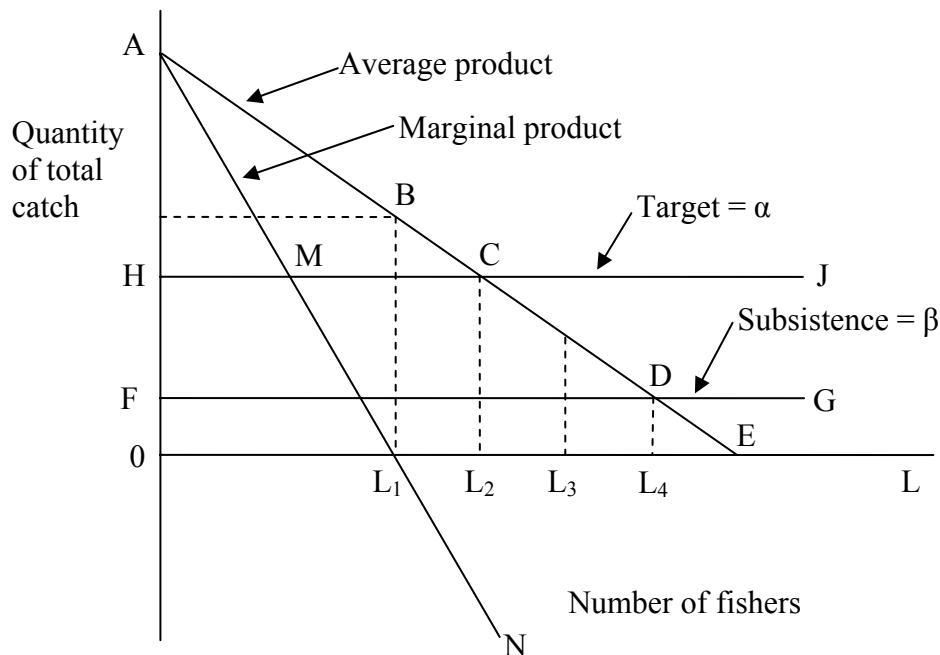
Figure 3: In developing countries open-access to resources is likely to result in an equilibrium where users of the resources only earn a subsistence level of income that corresponds to point E in this case



If initially income per fisher exceeds the subsistence level, β , for example is at α , numbers engaged in fishing increase and do so until incomes fall to subsistence level. In this case, the open-access equilibrium will be at E and L_4 fishers will be employed in fishing. This is an excessive number in relation to the target income per fisher of α . It is $L_4 - L_3$ more than required for the desired result, which corresponds to point C. However, of course, even C is not economically optimal because it involves more effort than is compatible with achieving maximum sustainable yield. This occurs at point B and involves the employment of L_2 fishers, assuming that each fishes or works a ‘standard’ number of hours. However, the government may not have the ability to regulate effort in the industry to achieve this result or may not have sufficient knowledge to identify this maximum.

The issues can be most easily analysed by considering per unit curves that correspond to those on Figure 3. These are shown in Figure 4 supposing that the production function is a quadratic. Line ABE represents the average product from fishing and line AMN is its corresponding marginal product line. OF represents the subsistence level of income and OH represents the target level of per capita income. The equilibrium occurs at point D if open-access prevails, and per capita income is β which is below the target level of α .

Figure 4: Long-run relationships between marginal product and average product as a function of fishing effort



Now it can be observed that if the long-run open-access equilibrium, D, prevails that the government of a developing country has no leeway to extricate the community from this situation, for example to reduce effort so income per fisher rises from β to α . For example, given that fishers have no opportunity to earn a subsistence level of income elsewhere, any attempt to reduce the effort of each will initially depress their incomes below subsistence level. This is because **initially** their catch is likely to fall in proportion to the reduction in their effort. Only in the longer term will levels of the population of the fish increase. If fishers are already at or near the poverty level, reducing effort will initially force them below it; a situation that will be politically unacceptable. Because of limited finances available to governments in developing countries, they are likely to be unable to provide income support to fishers while the level of fishing stocks recover.

If π represents average income earned by fishers, then the higher is π in relation to β , the subsistence level of income, the greater is the scope for reducing effort in the open-access industry without reducing per capita income to a level below subsistence in the very short term. For example, if L_3 in Figure 4 represents the numbers employed in open-access and if π is their

per capita income, a level of labour effort equivalent to that in the following equation is compatible with those in the industry obtaining a subsistence level of income in the very short term:

$$L = \frac{\beta}{\pi} L_3$$

This involves a reduction in labour used of $L_3 - \beta/\pi L_3 = (1 - \beta/X)L_3$. It is assumed that the 'standard' hours of work of each fisher are reduced uniformly to achieve this. Assuming that $\pi = \beta$, the scope for reducing effort, and not going below subsistence income in the short-term will be greater, the further the industry is below the open-access equilibrium. If the workers employed correspond to the open-access equilibrium $\beta = \pi$, no scope exists to reduce effort and obtain at least a subsistence level of income in the short-term.

4. Political Failure

Why do governments in developing countries fail to manage open-access resources in a way that prevents communities getting into a subsistence (poverty) trap? Several factors could play a role.

First, many governments are myopic and reactive rather than proactive in adopting policies. Governments very often do nothing to rectify a situation until it deteriorates greatly and there are pressures from those affected for political action. However, by then, as in this case, possibilities for effective political action may have disappeared.

Secondly, the costs and difficulties faced by governments in developing countries in regulating resources used by those living in rural villages should not be underestimated. This is a barrier to the management of resource use and appears to be a more serious one than in developed economies.

Encouragement of the adoption of new more productive technologies is sometimes seen as a means to assist those in open-access industries to raise their income. This it can do. However, unless it is accompanied by appropriate regulation of effort, in the long-run and given the model outlined here, income per head will sink back to subsistence level. For example, new technology may cause the productivity curves in Figure 4 to move upwards, and in the short-term, this will raise income per capita. However, higher incomes may increase entry or the level of the

population depending on the industry, and a new equilibrium at the subsistence level of income will be established in the long-term.

Nevertheless, the above case is a relatively favourable one. Another possibility is that the productivity curves in Figure 4 move upwards on their left hand side but swing sharply left (clockwise) on their right hand side. This can occur because the new technology depresses the population of the fish stock at a faster rate in relation to effort than the previous technology. The new average product curve could, therefore, cut line AD to the left of D. A new open-access equilibrium might be established with less employment than with the previous technology but with the same level of subsistence income. This raises serious problems for those who are no longer able to earn a subsistence level of income in the industry due to the introduction of the new technology, that is those displaced by the new technology.

5. Concluding Comments

The governments of developing countries face formidable problems in managing their open-access resources in a manner that prevents over-exploitation of these resources, and which also stops those who rely for their livelihood on such resources falling into poverty. The problems faced in managing open-access resources in developing countries has been shown to be much more serious than in developed economies. Policies used to manage such resources in developed economies are difficult or impossible to apply in less developed economies.

A major problem for developing countries is that their open-access industries are likely to come into an equilibrium in which those engaged in those industries just earn a subsistence level of income at or near the poverty level. As demonstrated, once such an equilibrium emerges, governments in developing countries have no leeway to extricate themselves from it. This has implications for foreign aid. Governments of developing countries wishing to adopt policies to reduce harvesting in open-access industries need foreign aid to provide income support to those involved in the transition. Or, alternatively, they need foreign aid to develop industries that can provide alternative employment for those displaced by reduced effort in an open-access industry. In some cases, for example, fisheries, aquaculture development could provide an alternative. On the other hand, foreign aid designed to increase the productivity of the open-access harvesting may, as explained above, do more economic harm than good in the long run.

In conclusion, it should be observed that the standard economic theory of the use of open-access resources has limitations when applied to developing countries. This theory suggests that there is greater scope for public management of these resources than does exist in practice. Understandingly, this theory does not consider the possible poverty trap associated with the use of those resources in developing countries. This trap seriously limits the capacity of governments in developing countries to address the over-exploitation of open-access resources.

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