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Poverty Alleviation and the Prospects for Micro-Enterprise Development: Lessons from the Subsistence Fishing Industry

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INTRODUCTION

This paper seeks to make a contribution to the understanding of how poverty alleviation may be linked to targeted income transfers that encourage micro-enterprise development. For the purposes of explication, the analysis is based on the characteristics of coastal communities in general, and the subsistence fisheries sector in particular. The main objective of the paper is to empirically guide the understanding of the impact of income transfers on a given population, and to assess whether those transfers could possibly lead to more sustainable forms of income generation activities in poor communities. Thus, the possibility of micro-enterprise development is used as a reference point in the discussion rather than investigated in detail as a related topic. Although specific emphasis is placed on the fisheries sector, the real utility of the analysis lies in its adaptation of a reproducible method to quantify the impact of poverty alleviation expenditure while simultaneously exploring the scope for micro-enterprise development given these transfers.

Methodologically, our empirical approach is based on the Foster, Greer and Thorbecke (FGT) (1984) index of poverty measures, which have already been successfully employed when analysing poverty alleviation and public expenditure in South Africa (*viz* Bhorat, 1999; Bhorat and Leibbrandt, 1999). However, this paper will extend the method beyond the realm of the public sector *per-se*, and apply it within the general context of an income grant that could also be linked to a micro-finance scheme for example. As a consequence, we are equally concerned with post-income transfer effects – e.g. what is the impact on income levels in the target population, who are the likely beneficiaries of the transfer and why, is the transfer sustainable over time, and can the transfer be used as a catalyst for micro-enterprise development and hence more sustainable income generation activities among poor people. In the discussion below, these questions are applied to the fisheries sector, and so must take into account the specific circumstances of the case study. Despite this specificity, it is important to stress that this is a hypothetical exercise, and the results of the simulations do not imply causality in the relationships nor accuracy with respect to the sample of subsistence communities chosen.

The data on subsistence fishing communities is primarily taken from surveys conducted by the Subsistence Fisheries Task Group (SFTG) of the Chief Directorate: Marine and Coastal Management (CD: MCM), while income data for these communities is taken from both the Census (1996) and October Household Survey (1995) (OHS95).

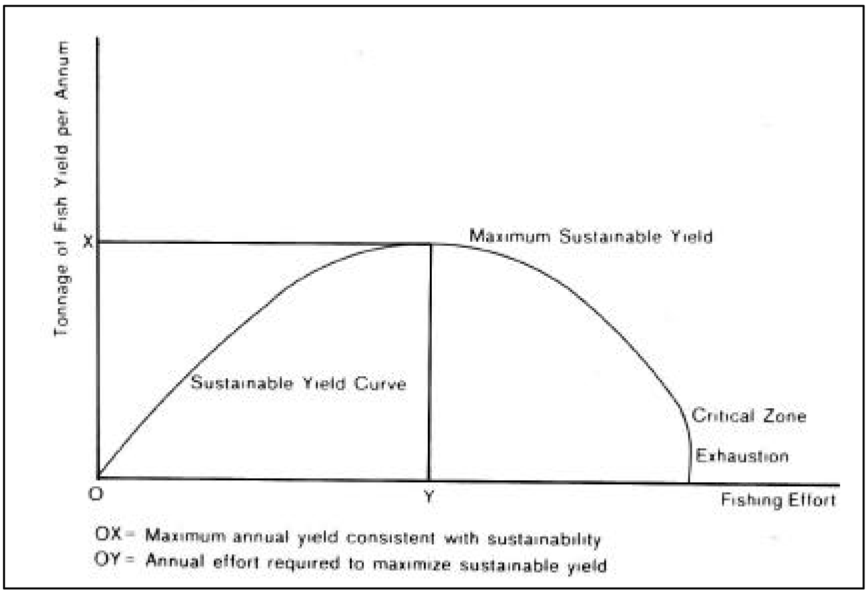
BACKGROUND: THE FISHING INDUSTRY IN SOUTH AFRICA

The fisheries sector makes a small, but significant contribution to GDP. In 1995, the total commercial catch was approximately 580 000 metric tons, which translated into a wholesale (processed) value of approximately R1.7 billion (approximately 0.5% of GDP in 1995) (CD: MCM, 1997, 7). In employment terms, it is estimated that the total number of people employed in the commercial sector is approximately 26,000-27,000, distributed equally between sea- and shore-based workplaces. In addition to these, it has also been estimated that another 60 000 people find employment in related sectors, exclusively or partly dependent on the fishing industry as a market for its supply of stores, equipment and services (ibid, 7). Provision of the same equipment and services to the recreational sector is another source of employment, though accurate estimates in this regard are not available. Similarly, no reliable information is available with respect to employment in the subsistence sector, though the importance of the industry as a source of both income and nutrition to coastal communities is fairly intuitive.

The history of the fisheries sector is filled with turbulence. During Apartheid, fishing rights were taken both from the oppressed and coastal communities more generally, and granted to medium to large-scale corporations. The tendency to favour large-scale industries over smaller firms was indeed consistent with the policy of import substitution followed by the regime. Administratively, this meant that the state, which presided over the allocation of fisheries (a common property resource), allocated vast quantities of rights to commercial large-scale (white) enterprises. The racial bias to the application of this policy was, again, consistent with the prevailing ideology of the time, made worse in the fishing industry by the legislative criminalisation of poorer members of coastal communities who tried to harvest the resources from the sea in either a subsistence or commercial manner.

In terms of the allocation of access rights to the fishing industry, the Chief Directorate: Marine and Coastal Management (CD: MCM) are bound by the biological limits of individual species of fish. The allocation of fisheries is thus based on the principle of the maximum sustainable yield, which implies that, in any given year, the total quantity of fish that can be caught must not compromise the ability to harvest the same quantities in the following year.

Figure 1: The Maximum Sustainable Yield (MSY) Curve



SOURCE: Rees,1985, 28

As Figure 1 illustrates, the MSY is the relationship between the amounts of fish caught relative to the levels of fishing effort exerted. In terms of allocating rights to fish, the MSY is associated with the concept of a Total Allowable Commercial Catch (TACC), which is the total annual allocation of resources (usually in tonnes) – determined by scientists who monitor the stock levels of individual species – that are allocated to commercial enterprises in any year. In the past, no allowance was made for the subsistence sector, though people within these communities continued to fish. Given that the TACC for individual species was set at the theoretical MSY for each species, this effectively meant a shift to the right of the MSY point in our above diagram, consequently placing pressure on the resources in excess of their regeneration rate.

The transition to democracy thus brought with it hopes of change for coastal subsistence-fishing communities. However, considerable acrimony has been experienced trying to effectuate this change. Three discernible reasons have contributed towards this.

1. As mentioned above, fisheries are natural resources that must be managed in a sustainable manner. From a management perspective, this requires a *precautionary approach* to the granting of exploitation rights, especially given imperfect information concerning the stock levels of individual species at any given time. This implies that the supply of fish must be limited more than would usually be the case (i.e. left of the MSY point in our above diagram), and the TACC should be set lower than the MSY rather than equal to it.
2. Demand for the rights to fish far outstrips the supply of these rights. This has become particularly acute in a post-Apartheid environment where the historically oppressed and coastal communities are seeking restitution of the rights once taken from them.
3. Up until 1994, no allowance was made in the total allowable catch for subsistence rights, which meant that thereafter, far more pressure was placed on government to correct this. However, very little information was known about the nature or definition of subsistence fishing, which further inhibited efforts to encourage the sector's growth.

The latter point is of particular concern to our discussion. In 1999, the CD: MCM initiated a far-reaching study that sought to identify and profile the socio-economic and bio-geographic (i.e. biological and geographical) characteristics of subsistence-fishing communities. The study consisted of two major surveys – the first identified 143 such communities that stretched across the entire SA coastline while the second profiled the socio-economic characteristics of twenty communities where household data was collected. In the former survey, a detailed breakdown of the species utilised by subsistence fishers in their respective locations was made, as well as pertinent information on product and factor markets collected[1].

Despite these laudable and necessary efforts, however, there is still very little understanding of how subsistence fishers operate and what to do with respect to resource allocation for subsistence communities. Moreover, there are few if any guidelines to assist policy makers understand the potential contribution that fisheries can *and cannot* make, and the necessary support services that may need to be provided in an effort to ensure that coastal economic development is engendered through fishing. Below we will explore whether an initial allocation of fisheries to subsistence communities may positively impact poverty levels and ultimately help foster micro-enterprise development.

METHODOLOGY

The primary methodological task is to examine the effects of a given transfer of fisheries (akin to an income transfer) on subsistence communities. Thus it is not only necessary to understand the scale and scope of poverty in the sample, but also to understand how

[1] NB: In this paper, only the results of the first survey are discussed. The second survey, while very relevant, was undertaken for the first time and had several inevitable methodological limitations, which inhibited us from conducting any econometric analyses based on the data. The method followed also made the survey incompatible with existing household surveys conducted by Statistics South Africa.

transfers of income – a result of either a public grant or through micro-finance schemes – affects the magnitude of poverty in the sample.

Owing to the fact that we are dealing with a specific form of income transfer, it is necessary to explore the nature of the income transfer (Δ) in more detail. It is evident that in the sample of communities that we are concerned with, individuals are already harvesting a specified quantity of fisheries. Despite this, there are numerous individuals that still fall below our chosen poverty. When discussing an income transfer, it is therefore with reference to an amount of resources greater than that which is currently harvested. Furthermore, because we are dealing with fisheries, we need to understand the differences in the potential realisable value of the species harvested over different areas of South Africa's coastline. Here it should be noted that the west coast has a far greater variety of fisheries than the east coast, which means that communities living in the Northern Cape, the Western Cape and certain parts of the Eastern Cape have a greater range of species to harvest than those living on the eastern part of the Eastern Cape and Kwazulu Natal coastline. The west coast is also well endowed with fisheries of greater value (e.g. lobster, abalone), implying that KZN communities are in fact again disadvantaged by bio-geographical endowments.

A given income transfer in the fisheries sector is therefore a function of both value and quantity, which, when divided, yields a quotient that represents the unit value of each fishery that is harvested. These unit values will differ according the species that subsistence communities are able to harvest, which, following from the above, will also differ according to the location of that community. Therefore, the nature of Δ in our sample is never absolute but relative.

Because we are dealing with fisheries, we may also want to consider how existing levels of resource-use contributes towards income levels. This requires a knowledge of the harvesting patterns of individual communities as well as the quantities harvested. Understanding the potential contribution of fisheries to the income levels of subsistence communities is thus a function of both the existing quantities of fisheries harvested and the potential realisable value of any further quantity of access rights granted to these communities. This can be expressed in the general form as:

$$Y_F = \sum_{f}^{F} \left[b_0 + b_{1f} \left(\frac{p_f}{q_f} \right) \right] \qquad (1)$$

Where Y_F is the total income attributable to fisheries, f is a specific fish species (e.g. lobster, abalone), F is the total population of all fish species, b_0 denotes the existing levels of income derived from harvesting any number of fisheries, b_{1f} is a quantity parameter for a given fishery, and p_f / q_f is the unit value of that fishery expressed in Rands per kilogram or Rands per tonne. The equation thus tells us that the contribution of fisheries to the income of subsistence-fishing communities is equal to the sum of the existing values of resources harvested plus the quantity of all new fisheries made available to the population concerned, multiplied by the unit values of each of those fisheries (to obtain the value of those fisheries).

When applying this to a discussion of income transfers, it is important to note that b_0 constitutes part of the existing income of an individual agent in our sample. Thus, when evaluating any further allocation of access rights, b_0 is not included in the simulations of income transfers (Δ_i). Hence, following from equation (1) and noting the above, an income transfer involving greater access to a variety of fisheries for subsistence-fishing communities will take the form:

$$\Delta_i = \sum_f^F \left[b_{1f} \left(\frac{p_f}{q_f} \right) \right] \qquad (2)$$

Here, Δ_i is the given income transfer expressed in Rands. Using this equation, it is now possible to understand the role and contribution of the CD: MCM in alleviating poverty by allocating further resources to subsistence-fishing communities. It is now necessary to integrate the equations within the Foster, Greer and Thorbecke (1984) framework.

The FGT index of poverty measures allows us to identify the required income transfer necessary to lift a population of individuals out of poverty, which is set at a given poverty line[2]. It can be presented in the general form as:

$$P_a = \frac{1}{n} \sum_{i=1}^{q} \left(\frac{z - y_i}{z} \right)^a \qquad (3)$$

Where n is the total sample size, z is the chosen poverty line, q is the number of poor agents and y_i is the standard of living indicator of agent i. The parameter α measures how sensitive the index is to transfers between the poor units. The poverty gap measure (PG) is generated when α=1, and therefore for a given poverty line z is presented as:

$$P_1 = \frac{1}{n} \sum_{i=1}^{q} \left(\frac{z - y_i}{z} \right) \qquad (4)$$

The PG thus represents a direct measure of agents' incomes relative to the chosen poverty lines, and is therefore a money metric of poverty in the group under scrutiny (Bhorat, 1991, 1). We can therefore obtain a poverty headcount by simply calculating the number of people below the poverty line (q). Because the PG measure is being linked to money values, it can be utilised to run simulations on the poverty impacts of income transfers to the poor for any given reference group in society (ibid, 1). Thus we can calculate the minimum financial cost of poverty alleviation by assuming that the poverty outcome in each sub-group is for P_1 to be zero. Put differently, this means that the income to each agent in the sub-group or society (y_i), would be at least equal to the value of the poverty line (z). This value can be determined from equation (4) by calculating:

$$\sum_{i=1}^{q} (z - y_i) \qquad (5)$$

[2] NB: The chosen poverty line in this paper is an income-based measure, though consumption and nutrition-based measures are equally, if not more valid (see Deaton, 1997, 134-162). The reason why we have chosen income is because data on consumption characteristics is not available in either the Census 1996 or in the OHS95. It is also necessary to note that because we are dealing with communities that harvest fish as part of their weekly consumption (which they are not paying for), we are dealing with a nutritionally biased sample (because fish is a protein-rich source of food); hence, both nutrition ranges and consumption metrics would be less-valid poverty lines in this instance.

A reformulation of this, and one that is easier for calculation purposes is nzP_1 (ibid, 2). Using this as a basis, we can therefore present the minimum financial cost of eradicating poverty as measured by P_1, to the sub-group or society by the value associated with nzP_1 (Kanbur, 1987, 71). This figure represents the minimum commitment required by the income-granting agent to eradicate poverty in that it assumes perfect targeting, with zero administrative and other costs generally associated with income-transfer schemes. It is also assumed that the scheme will elicit no behavioural responses from any potential recipients.

The value of nzP_1 can be extended to include sub-divisions of the total sample. In so doing, we thus are able to develop a proxy for the minimum financial commitment required to eradicate poverty amongst different groups in society (at either the household or individual levels). It is also useful to determine the poverty impact when committing to income-transfers less than the value of nzP_1. In this way, and as Bhorat (1999, 2) has pointed out, we engage in sensitivity analysis that provides results which correlate intermediate expenditure changes to intermediate alterations in the poverty gap. Kanbur (1987) suggests two ways of doing this: an additive and a multiplicative method. The additive income transfer would be an absolute transfer independent of the income earned by the recipient; for example, one could think of an absolute increase of R100 to all q agents. For a multiplicative grant, the transfer would be set as a fraction or percentage of the recipients given income, implying that the absolute amount would differ across agents.

We can examine the monetary implications associated with an additive or multiplicative transfer empirically using Kanbur's (1987) formulae. In terms of the additive case, and assuming that we account for the entire income distribution, an increase in everybody's income in the society of an absolute amount, Δ_i, will mean that equation (3) takes the form:

$$P_a = \int_0^{\Delta} \left(\frac{z - y - \Delta}{z} \right)^a f(y) d(y) \qquad (6)$$

Hence each agent would get a transfer in each scheme of Δ_i, while the total cost of the scheme would be Δ. The marginal impact on poverty, as measured by P_1, would be calculated as (Kanbur, 1984, 73):

$$\frac{dP_a}{d\Delta} = -\frac{a}{z} P_{a-1} \qquad (7)$$

Equation (7) presents the unit change in poverty as measured by P_α, given a unit change in the transfer value Δ_i to each agent in the sample. Hence, an increase of Δ_i to each agent in the sample would cause poverty to fall by a calculable value. From this, it is possible to see that the amount by which poverty will decline is proportional to $P_{\alpha-1}$. Using P_1 as a guideline, an increase of Δ_i would lift a certain number of individuals out of poverty. In this way, the change in poverty can be measured in relation to the poverty line z, and the headcount index P_0 (or more generally $P_{\alpha-1}$). The headcount index is therefore an important indicator of the impact of public spending on poverty, despite not serving as the direct measure of poverty in the methodology.

The second simulation case is the multiplicative transfer, whose distribution function associated with Δ, and its impact on measured poverty respectively are (from Bhorat, 1999, 3):

$$P_a = \int_0^{z/(1+\Delta)} \left[\frac{z - y(1+\Delta)}{z} \right]^a f(y)d(y) \qquad (8)$$

$$\frac{dP_a}{d\Delta} = -\frac{a}{1+\Delta}\left[P_{a-1} - P_a\right] < 0 \qquad (9)$$

Here, the value of the transfer is expressed as a share of the income of each agent. Again, the headcount index is a relevant variable in understanding how income transfers affect measured poverty. Here, it is the weighted difference between P_{α} and $P_{\alpha-1}$ that calculates the degree to which poverty falls after an income transfer that is multiplicative in nature.

It is important to understand the two examples of income transfers, for they have very particular implications when applied to a given case study. A welfare grant that targets all members below a given poverty line is an example of an additive transfer, while a resource grant, such as one granted in the fishing industry, is an example of a multiplicative transfer. This is because not all individuals will be able to harvest the same quantities of resources, which would instead be a function of the property rights regime, resource availability, eligibility to harvest those resources (and compliance with the rules governing eligibility), the potential realisable value of those resources, and the levels of access to capital among the *q* population and the (1-*q*) population (i.e. all others in the sample)[3].

SIMULATIONS FOR FISHING COMMUNITIES

This section applies the methodology discussed above to a sample of fishing communities obtained from the CD: MCM survey that identified 143 subsistence communities, stretching across the entire length of South Africa's coastline. We have used the Census 1996 database to identify as many of these communities as possible (in total, we were only able to find 86), and utilised the income variable in the Census to conduct an analysis of the Poverty Headcount (PH).

Before proceeding, it is necessary to highlight some of the limitations associated with identifying the communities in the Census. The first thing to note is that the task-team that conducted the SFTG survey split the coastline of SA into eight sections (A-H), based on the bio-geographical characteristics of those regions, rather than on provincial boundaries for example, and obtained information on a total of 143 different communities

[3] NB: It is important to at least consider the role of the (1-*q*) population (though a detailed empirical analysis is beyond the scope of this paper). An example will perhaps elaborate best. Recently, the CD: MCM zoned certain areas of the coast for subsistence use only. These zones are regulated under the conditions stipulated by the department, but more generally represent common property resources. Not all valuable resources are located in deep waters, making the zoning potentially lucrative to those who can exploit it. Here, those with greater access to capital will be able to harvest greater quantities of resources, and these people, in all likelihood, will not be part of the *q* population in our sample. Hence, the potential income of all *q* agents may decline due to individuals outside of that population (i.e. the 1-*q* population) harvesting in these areas, and thereby reducing the absolute quantity of resources available to the *q* population. To understand this process empirically, it would be necessary to simu late the harvesting patterns of both the *q* agents and the (1-*q*) agents concurrently.

that were known to be involved in subsistence fishing. The survey consisted of researchers interviewing members of those communities, CBOs or other knowledgeable sources (e.g. conservation agents) who were involved in fishing in some way; as a consequence, not only subsistence fishers were consulted. When these communities were found in the Census, they would have, naturally, included individuals who had nothing to do with subsistence fishing. However, by reducing both the SFTG Census sample and the National Census sample by economic sector (here, we were only able to disaggregated to the one-digit S.I.C. level, and so were left with all individuals in the Agriculture, Hunting, Forestry and Fishing sector), we were able to select a more valid sub-sample of these communities.

It should also be noted that the income variable in the Census is categorical, which meant that while we were able to calculate the poverty headcount, we were unable to run the FGT (1984) index of poverty measures. Thus, in order to simulate the Poverty Gap (PG) measures, we used data on a selection of fishing communities from the OHS95. Here, we were only able to find nine fishing communities, of which the income characteristics were used in order to run the PG simulations. In order to obtain a more accurate sample size, we then weighted the OHS95 data to the Census dataset on subsistence communities obtained in the poverty headcount exercise described above. Because the data inconsistencies are rather prohibitive, the discussion below should be viewed as a first-step to understanding how the FGT class of poverty measures can be applied to the case study.

A Poverty Headcount for Fishing Communities

A poverty headcount (PH) is simply the number (or proportion) of individuals within a given sample living below a chosen poverty line. In this case, our choice of poverty line was dictated by the data. As mentioned above, the income variable in the Census (1996) is a categorical one, which thus dictated what our poverty lines could be. We chose two poverty lines: R500.00 and R1000.00 per month (NB: these are the two lowest income categories above R0.00 in the Census)[4].

We then analysed the PH percentages for the sample of communities identified by the Subsistence Fisheries Task Group (SFTG) compared to the total (national) sample for each poverty line. As noted above, both the national and the SFTG samples were disaggregated according to industrial sector, and only the figures for the Agriculture, Hunting, Forestry and Fishing sector in each sample were analysed.

Table 1: Sample Sizes for Fisheries and National Sample (for agriculture, hunting, forestry and fishing sector only)

SFTG Sample	**Male**	**Female**	**Total**
African	1071	533	1604
Coloured	2152	1204	3356
Asian	46	7	53
White	715	139	854
Total	3984	1883	5867
National Sample	**Male**	**Female**	**Total**
African	403646	165384	569030
Coloured	114997	62247	177244
Asian	2562	483	3045
White	64791	14275	79066
Total	585996	242389	828385

4 In this section, however, only the R1000 poverty line will be discussed. The results of the R500 simulations are included in Appendix One.

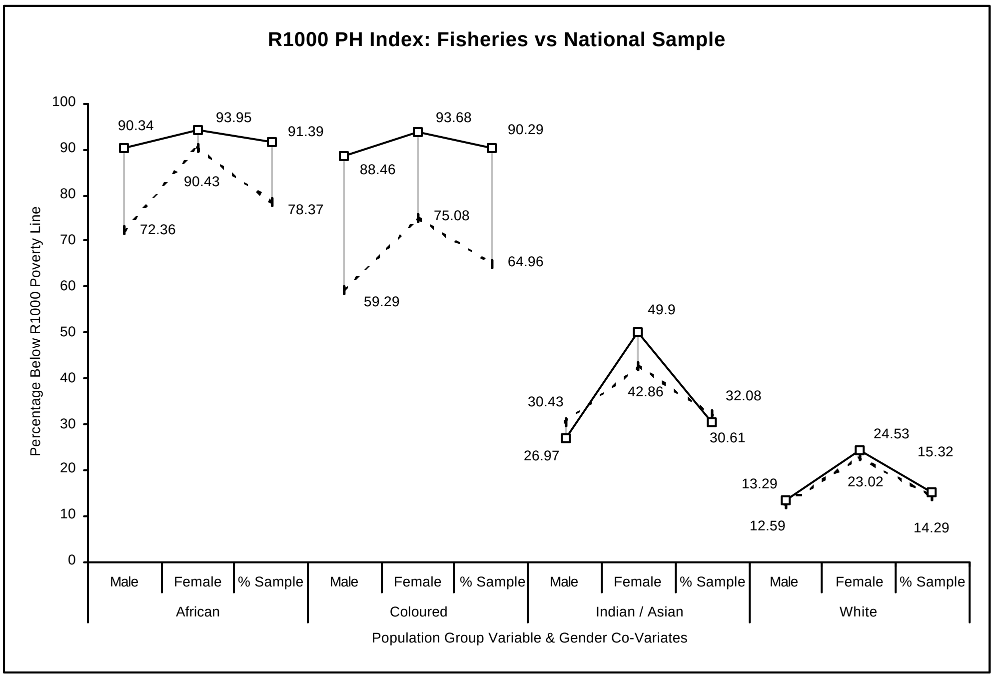
From the table it is clear that the Coloured population are over-represented in the SFTG sample when compared to the national sample. Applying the PH index to our sample for R1000, we thus obtained the following distribution of poverty:

Table 2: Poverty Headcount for SFTG and National Sample

Variables		% Below Poverty Line: R1000	
		SFTG Sample	National Sample
African	Male	72.36	90.34
	Female	90.43	93.95
	% Sample	**78.37**	**91.39**
Coloured	Male	59.29	88.46
	Female	75.08	93.68
	% Sample	**64.96**	**90.29**
Indian / Asian	Male	30.43	26.97
	Female	42.86	49.9
	% Sample	**32.08**	**30.61**
White	Male	12.59	13.29
	Female	23.02	24.53
	% Sample	**14.29**	**15.32**

The table shows the percentage of each sample below the R1000 poverty line, disaggregating the figures by population group and then by gender. The % Sample column is the percentage of each population group below the poverty line. Further insight into the data trends can be seen in the figure below.

Figure 2: Distributional Characteristics of Two Samples at R1000 Poverty Line



In the above figure, the Fisheries sample is represented by the dotted line. An interesting interpretive aspect of each distribution displayed above is the point that the %

Sample figure lies between the range of the male and female figures, which gives us an indication of the relative sample size of each co-variate and how it has influenced the aggregated figure. Here, a larger sample of males relative to females would pull the % Sample figure down, closer to the male figure. Of course, the converse applies to the female case. For example, for the African population in the SFTG sample, there are more males than females, which accounts for the % Sample figure being closer to the male figure. We can see that this trend is prevalent across all races in both samples, reflecting the male bias to the data.

Generally, we can also see that there are identical distributive poverty trends between the fisheries and national samples with respect to the gender and racial distribution of poverty. Here, it is evident that the PH figures for males are always less than the same for females, and African and Coloured poverty rates are considerably higher than the same for Asians and Whites, corroborating similar evidence found in related research on SA (Bhorat & Leibbrandt, 1999). Despite this however, the inter-sample degree of variation per race suggests that African and Coloured males are at least 20 percent wealthier in the SFTG sample than in the National sample. Indeed, this trend is evident for both males and females in the Coloured population, while in the Indian and White populations there are almost equal distributions of poverty between the samples. On the whole, it can therefore be concluded that the SFTG sample is a wealthier one.

The intra-sample magnitude of poverty also reveals some interesting trends. In the SFTG sample, Africans and Coloureds have far more acute gender-based poverty ranges, with males at least 16 percent more wealthy than females. When compared to the national sample, this range is considerably lower at approximately three and five percent for Africans and Coloureds respectively, though this is not mimicked in the Indian and White populations. Thus, relative to men, women are more disadvantaged in the SFTG sample when compared to national trends.

It is also revealing that the absolute magnitude of poverty in both samples is exceedingly high. Notwithstanding the fact that each sample contains a certain percentage of zero earners (SFTG: 0.95% of *q* population, National: 1.26% of *q* population; included because we are dealing with the informal sector), these figures overwhelmingly represent the income of the employed workforce in the agriculture, hunting, forestry and fishing sector, and we would expect that the incidence of poverty in the population would be lower. It is thus a revealing attribute of the sector, where low wage rates possibly combined with above-average levels of in-kind support ultimately leave individuals with very little monetary income.

Poverty Gaps in Fishing Communities

In this section we are concerned with the application of the FGT (1984) measures of poverty gaps to our fisheries sample. Essentially, this means that we need to identify all individual agents below the given poverty line of R1000, and calculate the level of expenditure necessary to raise this population out of poverty. We then need to link this expenditure to the range of species harvested in different communities across the coastline.

As noted above, we had to change our data source for this section owing to the limitations attached to using the income variable in the Census. This meant that we had to instead use a sub-sample of the OHS95 that corresponded to the regions found in our Census sample. Here, there were only nine such regions, making the analysis below a very tentative one. The application of the FGT class of poverty measures should thus be viewed as developing a *proxy* for the understanding of how fisheries can be used to alleviate poverty. Owing to the small sample, it follows that any policy implications should be viewed with caution, for the real utility in the analysis is the application of the approach itself and the way in which it allows us to conceptualise and attach a value to poverty alleviation efforts within a given industry, whereafter, other pertinent characteristics may be discussed. It should also be reiterated that the simulations are not sensitive to administrative and other set-up costs associated with a given income transfer, implying that the results of the simulations do not directly translate into the necessary expenditure to eradicate poverty.

It was noted above that the minimum expenditure required to yield zero poverty in the sample is represented by nzP_1. In the discussion below, we thus need to understand the values of nzP_1 for the population variable and the gender co-variates. The decomposability properties of the FGT measure are particularly useful here, and the P_1 measures are calculated according to the formula (from Bhorat, 1999, 4):

$$P = \frac{\sum_{j=1}^{m} P_j n_j}{n} \qquad (10)$$

Where the j individuals are summed by the m sub-groups in the sample and then weighted by the total sample, n, to derive the composite P_1 value[5]. It is also necessary to note that the OHS95 sampled approximately 30 000 households, drawn from ten selected households in each of 3 000 clusters. The sample size thus needs to be numerically weighted so that they more accurately reflect the characteristics of subsistence communities[6]. It should lastly be noted that the data in this section is not based on the agriculture, hunting, forestry and fishing sector only, but rather is reflective of the total population – both employed (across all sectors) and unemployed. The table below reflects the poverty gaps for fishing communities.

Table 3: Minimum Poverty Alleviation Expenditure for OHS95 Sample (R1000)

Variables		n	q	P_1 Weighted	Exp. p.a. (nzP_1)	% of Total Exp.
Consolidated Total		**5867**	**3542**	**0.2972**	**20,924,069**	**108.2 (Error: 8.2%)**
African	**Sub-Total**	**1604**	**1247**	**0.1361**	**9,585,504**	**45.81**
	Male	1071	769	0.0765	5,388,844	25.75
	Female	533	478	0.0534	3,762,767	17.98
Coloured	**Sub-Total**	**3356**	**2164**	**0.1741**	**12,258,797**	**58.59**
	Male	2152	1268	0.0832	5,856,883	27.99
	Female	1204	896	0.0796	5,607,269	26.80
Indian / Asian	**Sub-Total**	**53**	**17**	**0.0002**	**11,639**	**0.06**
	Male	46	14	0.0001	7,673	0.04
	Female	7	3	0.0000	1,974	0.01
White	**Sub-Total**	**854**	**114**	**0.0111**	**783,972**	**3.75**
	Male	715	84	0.0049	346,632	1.66
	Female	139	30	0.0029	207,499	0.99

[5] The value for the minimum financial commitment by m sub-groups will therefore be equal to $nz\sum_{j=1}^{m}\frac{P_j n_j}{n}$, the weighted expenditure estimates.

[6] NB: The data was weighted according to the Census SFTG sample size and distribution. However, a considerable degree of error was introduced in the process. For the unweighted comparison, see Appendix 2.

It is evident from the table that Africans and Coloureds have, as expected, the greatest percentage of people living in poverty, translating into the need for the majority of poverty alleviation expenditure to be spent on these populations. An interesting trend is that Indians have lower poverty rates than Whites, though this is perhaps partly due to the small sample size of the Indian population in the sample population. Males require a greater percentage of expenditure in every population group, reflecting their larger population size. Lastly, it should also be noted that even though this is an inexact method, it is a powerful one because it calculates a money metric and then a value to the level of expenditure needed to eradicate poverty. Having said this, however, it by no means implies that a corresponding expenditure would eradicate poverty, owing to the fact that the figures do not quantify the administrative costs necessary to implement such a scheme.

Developing a Proxy for the Value of Resources Required to Alleviate Poverty

Now that we are able to quantify the total expenditure needed to eradicate poverty, it is necessary to identify the role and contribution that fisheries can make towards this required expenditure. In order to do this, we need to know which fisheries are currently harvested in these regions as well as the unit values of these fisheries. A general typology of known subsistence fisheries is presented in the table below.

Table 4: Unit Values (Rands per kilogram) for Selected Fisheries

Fishery	Landed Value (LV) R'000	FOB value* R'000	Landings (L) (Tons)	R/kg [LV/L]	R/kg [FOB/L]	Ratio (FOB/L:LV/L)
Abalone	13245	54054	616	21.50	87.75	4.08
Handline Fishing	28737	35209	4929	5.83	7.14	1.23
Mussels (rock/sand)	-	16195	1680	-	9.64	-
Oysters	515	1431	160	3.22	8.94	2.78
Prawns (sand/mud)	-	2572	77	-	33.40	-
Redbait	-	54	9	-	6.00	-
West Coast Rock Lobster (WCRL)	54264	121190	1859	29.19	65.19	2.23
Seaweed	1439	4215	1250	1.15	3.37	2.93
Small net fishing	2110	3895	1338	1.58	2.91	1.85
Squid	58021	102390	6826	8.50	15.00	1.76

* Wholesale Processed (Free On Board) Values
SOURCE: Stuttaford, 1997, 39; Own Calculations

The table has two important columns with respect to unit values (expressed in R/kg) – the LV/L and FOB/L values. Ordinarily, subsistence communities would harvest fish for their own consumption, but would also engage in selling a portion of their catch. When they did sell, they would more likely be selling at prices similar to the LV/L values, reflecting the fact the fish, when sold, is done so directly after being caught, rather than being processed in any way first before selling, which would resemble values more closely related to the FOB/L values. Subsistence fishing is therefore characterised by low value creation.

When applied in the context of expenditure per annum estimates for poverty alleviation discussed above, it is now possible to see how fisheries may contribute towards poverty alleviation. Any number of resource transfers are possible, but a few broad comments are necessary in this regard. It is evident from the table that the two fisheries with the greatest values (at both LV/L and FOB/L prices) are WCRL and abalone, followed distantly by squid. Prawns and mussels both have high FOB values, but no data is available for the landed value of either fishery, and the figures in the table represent the prices for cultivated mussels and prawns only, which is not a subsistence form of fishing. However, subsistence fishers do harvest both mussels and prawns more generally, but their lack of access to markets prevent them from selling much of their catch. Similarly, a lack of capital (such as basic refrigeration equipment and sanitary work places) has the same effect. Lower value fisheries include handline fishing and small net fishing, where any of a number of fisheries are caught, some more lucrative than others (e.g. kingklip relative to hake).

From the point of view of using fisheries to alleviate poverty, it would be a logical step to ensure that subsistence communities have greater access to higher value species. Given this, the expenditure per annum values for poverty eradication will be reached faster and with lower quantities of resources. Because fisheries are allocated by the state, this would amount to a commitment to provide these communities with greater quantities of WCRL and abalone for example. Any such allocation would thus represent the values for Δ_i in the FGT class of poverty measures[7]. Having noted this, we do need to establish whether fisheries can in fact fully eradicate poverty in the sample. This can be achieved by comparing annual poverty eradication expenditure (nzP_1 in Table 3) with the total combined value of fisheries harvested by subsistence communities, presented in the following table.

Table 5: Comparison of Value of Selected Fisheries (from Table 4) and Expenditure Per Annum Estimates (from Table 3)

Sample	Total Landed Value (R)	Total FOB Value (R)	Exp. p.a. (weighted) (R)	% Landed Value	% FOB Value
Combined Value of Subsistence Fisheries (from Table 5; R1995)	158,331,000	341,205,000	20,924,069	16.69	6.12

The data shows that in order to fully eradicate poverty, it would require 16.7 percent of the landed value and 6.12 percent of the FOB value of known subsistence fisheries. This supports the conclusion that considerable benefits can be afforded to subsistence communities by allocating a greater proportion of the total allowable catch of these species to them.

The Impact of Income Transfers on the q Population

We now have a good idea of the minimum expenditure necessary to eradicate poverty in subsistence communities. However, it is also important to understand how transfers below this value will affect poverty. Below, we discuss these implications by focussing on two, related elements:

1. The impact of three, below nzP_1 expenditure per annum income (or resource) transfers on the population, and

[7] That is, following the logic of equation (2): $\Delta_i = \sum_f^F \left[b_{1f} \left(\frac{p_f}{q_f} \right) \right]$

2. The effect that these resource transfers will have on inequality within the *q* population.

When considering transfers of resources, it is important to note that they would always amount to a multiplicative transfer, rather than an additive one. This is due to the fact that not everyone in the *q* population will have equal access to capital; thus, some will benefit more than others. Furthermore, once these transfers are estimated, it then becomes possible to understand the impact of these transfers on inequality within the *q* population, and so generally determine who will benefit from the transfer.

In the tables below, three resource transfers of R500, R700 and R900 per month are simulated, and their impacts assessed. The rationale for the choice of these transfers are based in the fact that the median income in the *q* population is R300, and, accordingly, R700 is required to lift this individual out of poverty. The transfers of R500 and R900 are then simulated so that we can understand what impact a below- and above-median related resource transfer will have on the population.

Table 6: Multiplicative Transfer of R500 p.m. (R6 000 p.a.)

Sub-Group	Old P_1w	New P_1w	% Change
Total	0.2972	0.245	-17.56
African	0.1361	0.1181	-13.26
Coloured	0.1741	0.1348	-22.58
Asian	0.0002	-	-
White	0.0111	0.0087	-21.87

Table 7: Multiplicative Transfer of R700 p.m. (R8 400 p.a.)

Sub-Group	Old P_1w	New P_1w	% Change
Total	0.2972	0.2335	-21.43
African	0.1361	0.1136	-16.56
Coloured	0.1741	0.1267	-27.23
Asian	0.0002	-	-
White	0.0111	0.0082	-26.36

Table 8:Multiplicative Transfer of R900 p.m. (R10 800 p.a.)

Sub-Group	Old P_1w	New P_1w	% Change
Total	0.2972	0.2242	-24.56
African	0.1361	0.11	-19.21
Coloured	0.1741	0.1208	-30.62
Asian	0.0002	-	-
White	0.0111	0.0077	-30.85

The above tables decompose the transfers by race and total population. We can see that a multiplicative intervention that lifts the median individual out of poverty (i.e. R700) reduces total poverty by 21.43 percent. In the R500 sample, the corresponding figure is 17.56 percent and in the R900 sample it is R24.56 percent. As far as determining who will benefit from the income transfers is concerned, it is clear from the tables that the Indian population is the greatest group of beneficiaries in all three income transfers, so much so that poverty within the group is eradicated entirely. Otherwise, the population group that will benefit the most in the R500 and R700 transfers are Coloureds, followed by Whites and Africans. This is a surprising trend, for it suggests that a greater proportion of Coloured people earn closer to R1000 than in the White population, though the trend is reversed in the R900 transfer.

Further insight can be obtained with respect to understanding who benefits from the income transfers by examining the *q*-population inequality levels before and after the multiplicative grants. For this purpose, we employ Gini-coefficients, the results of which are presented below.

Table 9: Change in *q* Population Inequality Levels as D Increases

Gini Coefficient				
Sub-Group	**Existing Income**	**D = Y*1.5**	**D = Y*1.7**	**D = Y*1.9**
Total	0.5484	0.6335	0.6696	0.678
African	0.6259	0.6831	0.7071	0.7138
Coloured	0.47	0.5742	0.6263	0.6382
Asian	0.0789	0	0	0
White	0.4871	0.5789	0.5962	0.5962

From the table it is clear that inequality will increase across most races and in the total sample as income is provided to the *q* population (at any of the three income transfers). The exception to this is of course the Indian population, who are immediately lifted above the poverty line after the first income transfer of R500 (accounting for the zero Gini-coefficients observed). It is also evident from the table that inequality levels increase at a more rapid rate between the R500 and R700 transfer than between the R700 and R900 transfer. This suggests that a greater proportion of the *q* population across all races initially move rapidly towards the poverty line, but *do not* exceed it and thereby exacerbate inequality levels. However, the tendency does not hold as larger income transfers are provided because the numbers of *q* agents are decreasing at a more rapid rate. Following this logic, it would suggest that there is a logarithmic progression of inequality levels as expenditure increases in a multiplicative manner until one individual had a positive, below poverty-line income, and the balance had zero (which would, of course, never increase beyond zero under multiplicative conditions). The latter scenario would then yield a gini-coefficient of one (the coefficient of perfect inequality), but as soon as this individual was lifted above the poverty line, the gini would be zero – the coefficient of perfect equality. However, a considerable degree of uncertainty exists in this discussion as there are only three simulations, and it would be necessary to run many more simulations first before such a conclusion could be deduced with certainty.

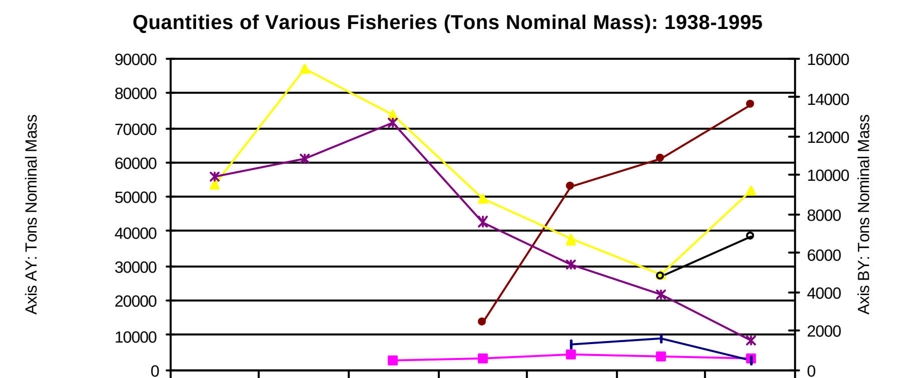
By way of summary then, we can say that a greater allocation of resources to subsistence fishing communities will steadily decrease the number of individuals in poverty, but concurrently increase the inequality levels within the poor population. We can thus conclude that there is a perfectly negative correlation between the number of poor agents and the level of inequality amongst the poor population as income rises in a multiplicative manner. Thus, rising inequality in the *q* population is a positive outcome of income transfers (given the limitations associated with zero earners in a such a transfer).

ERADICATING POVERTY IN A SUSTAINABLE MANNER

Now that we understand how resource transfers affect poverty levels, we do need to consider whether they are sustainable or not; that is, whether they can be allocated on a once-off basis or consistently over a period of time. In this section we evaluate this question with respect to fisheries, whereafter we discuss the implications for subsistence communities. Further profiling of subsistence fishers will then be undertaken in an effort to understand the constraints that they face, followed by a discussion of pertinent micro-enterprise characteristics found in the sample.

It has been noted in our discussion above that fisheries are natural resources that are subject to periods of over-exploitation from time to time. This calls in to question the ability to use fisheries to eradicate or alleviate poverty over time. Below are two graphs that display the stock levels of known subsistence fisheries.

Figure 3

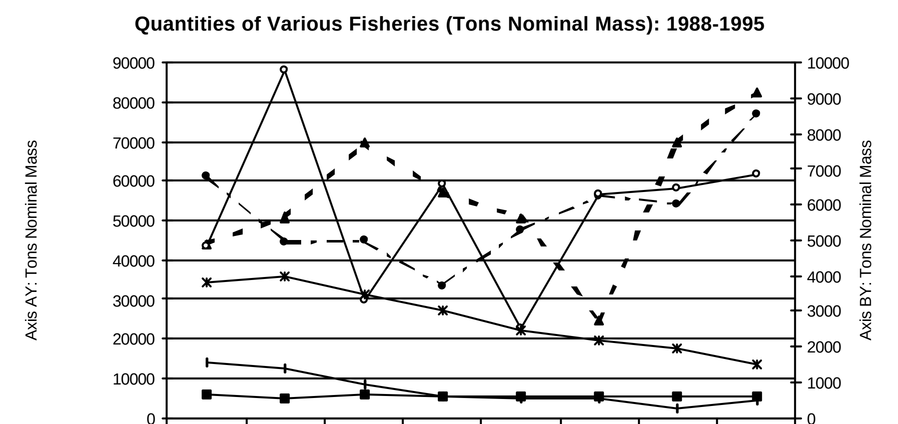


	1938	1948	1958	1968	1978	1988	1995
Redeye				13500	52700	61251	76664
Abalone			540	560	790	676	614
Prawn					1310	1572	498
Snoek*	9530	15420	13150	8800	6700	4892	9174
Squid						4824	6850
WCRL	9980	10890	12700	7620	5370	3834	1516

Years

SOURCE: Stuttaford, 1997, 26-27

Figure 4



	1988	1989	1990	1991	1992	1993	1994	1995
Redeye	61251	44360	44710	33484	47440	56331	54145	76664
Abalone	676	562	624	573	605	599	613	614
Prawn	1572	1389	952	566	559	521	265	498
Snoek*	4892	5639	7753	6339	5618	2757	7754	9174
Squid	4824	9792	3281	6572	2489	6308	6441	6850
WCRL	3834	4000	3491	2996	2480	2176	1956	1516

Years

SOURCE: Stuttaford, 1997, 27

Figure 4 shows that there have been markedly different trends in the quantities of certain fisheries since the late 1930s. Redeye and squid have both increased dramatically since 1968, while abalone and prawns have remained fairly constant over the time period. We can interpret the continual decline in WCRL as having been fished beyond its maximum sustainable yield, accounting for the continued decline since 1958. However, one should exercise a degree of caution when doing so, for if we evaluated the quantities of snoek, it would appear that a similar conclusion could be reached up until 1988, when in fact there was a subsequent increase in the population thereafter. This could account for accurate (or lucky) scientific estimations of the population and a precautionary approach to the management of the fishery by the CD: MCM, which it seems has allowed the fishery time to regenerate stock levels before allowing further exploitation.

However, the general trends evident in Figure 4 hide fairly dramatic annual fluctuations in stock levels, witnessed in Figure 5. The most dramatic of these fluctuations is found in the squid population, where quantities have often been more than double their previous year's value, only to drop by a similar factor the next year, for the period up to 1993. Both snoek and redeye also show clear variations over the shorter time-period in Figure 5. These trends suggest that these fisheries have life cycles and/or regeneration rates that are shorter than can be detected in Figure 4. This being said, however, the continual decline of WCRL is carried through in Figure 5, as are the trends for prawns and abalone. The fact that WCRL has been declining almost continually over the time period seems to corroborate the earlier speculation that the MSY for WCRL has long since been passed.

The data thus points to the fact that while some fisheries indeed seem healthy, others are far from it, and their capacity to be used in efforts to alleviate poverty may backfire if too much reliance is placed on vulnerable species (e.g. WCRL). However, the high fluctuation associated with many of the species also means that the returns from harvesting will vary a great deal in any given year, regardless of whether the individual fishery is vulnerable or not. It is thus impossible for subsistence communities to prosper on fishing alone, and alternatives need to be sought in poverty eradication efforts. We now consider the possibility of fishers in these communities to start micro-enterprises that could sustain or supplement income levels over time.

The Possibility Of Micro-Enterprise Development In Fishing Communities

In this section we seek to further profile the subsistence-fishing community, only this time we are interested in their business behaviour: where they sell fish, how they catch it, what value implications are attached to the product, etc. Specific emphases in this section are placed on factor markets, product markets, and the value implications of subsistence fishing. In our efforts, we are again assisted by the survey conducted by the CD: MCM on the subject.

Before proceeding, it is necessary to note the limitations associated with using the survey. As mentioned earlier in our discussion, the task-team that conducted the survey split the coastline of SA into eight sections (A-H), based on the bio-geographical characteristics of those regions. They obtained information on a total of 143 different communities that were known to be involved in subsistence fishing by consulting the SFTG who guided their selection of communities. The survey consisted of researchers interviewing members of those communities, CBOs or other knowledgeable sources (e.g. conservation agents) who were involved in fishing in some way; as a consequence, not only subsistence fishers were consulted. Researchers did emphasise that their primary aim was to focus on subsistence fishers, and so solicited information from the interviews that aided this purpose. There was consequently a considerable degree of selection bias (and possibly interviewer biases) in the survey results.

The report based on the survey then simply summarised the responses to the questions posed, and thus may not necessarily be factually based. Therefore, the reliability of the survey is, at best, marginal, and in the discussion that follows we are bound by these constraints. Despite the limitations, however, the survey remains the only nationwide source of information on subsistence fishing communities, and it is in this regard that the primary utility of the data lies[8].

Factor Markets

In this section we will analyse the source and employment of capital in fishing communities and the entrepreneurial skills of subsistence fishers, rather than focus on land and labour markets in too much detail, which have, generally, been fairly well researched in South Africa. We therefore make the assumptions that labour supply is highly elastic and land highly inelastic, however unrealistic these assumptions may be (e.g. migration of the economically active population in these communities could mean that labour supply is in fact fairly inelastic), and hold the factors constant throughout the discussion.

The entrepreneurial skills of poor people are very keen indeed, though they cannot be romanticised because they are borne out of dire need expressed in the severity of poverty, and without these skills, many poor people would not survive. It is also useful to note that entrepreneurship is increasingly being considered (and correctly so) the fourth factor of production, though nowhere is the success or failure of the entrepreneur more highly leveraged than in the informal sector, where failure is associated not only with a lack of income, but also with a lack of survival. This is often compounded by the lack of skills present in these communities to enter formal sector employment. In the sample of subsistence communities surveyed by the CD: MCM, it is evident that the overwhelming majority of individuals have a history of involvement in fisheries that is in excess of fifty years (Clark, 2000, 7). The importance of this history is great indeed, for it implies that these communities know the resource base and have been exposed to generations of knowledge on how to fish, where to fish, and how much to fish during different times. The length of their involvement in fishing also implies that it is a sector where these communities have a comparative skill advantage, and thus the importance of the sector as a form of employment (even be it informally so), income and nutrition cannot be underestimated.

In the table below, we discuss the importance and sources of capital before going on to draw inferences on the implications highlighted by the data.

[8] It should be noted that much of the biases introduced in the survey were unavoidable, and some necessary (e.g. those concerning the selection of communities). That which was unavoidable related to the nature of the survey, which was, again necessarily, qualitative in nature. The importance of these surveys, however, cannot in any way be over-stated, because very little is known about the vast sections of SA that are informal by classification. As more of these surveys are conducted, it is imperative that the research community play an active role in their guidance, so that elementary forms of bias are reduced where possible and, more generally, that some measure of debate ensues over how to apply survey methodology in the informal sector – given certain ethno-linguistic limitations – and ensure that they are more reliable.

Table 10: Use of Capital in Fishing Communities

Region	Fishing method (mean rate of response)	Fishers using boats (mean rate of response)	Number of boats with motors (mean rate of response)	Tools homemade (%)	Tools bought (%)	Combination (%)
A [Province: NC]	Net: 100 Trap: 60 Line: 80	> half	Approx. Equal	50	100	38
B [Province: WC]	Net: 58 Trap: 67 Line: 92	> half	> half	39	83	50
C [Province: WC]	Net: 28 Trap: 46 Line: 85	> half	> half	71	82	41
D [Province: WC/EC]	Net: 0 Trap: 0 Line: 100	< half	< half	86	43	95
E Province: EC]	Net: 62 Trap: 12 Line: 92	None	None	91	41	68
F [Province: EC]	Net: 3 Trap: 12 Line: 94	None	None	72	61	94
G [Province: EC/KZN]	Net: 24 Trap: 29 Line: 94	None	< half	8	15	100
H [Province: KZN]	Net: 74 Trap: 5 Line: 89	None	None	88	47	24

SOURCE: Clark, 2000, 7

In terms of fishing methods, we can see that there are very different usage patterns across the eight regions. In regions A-D (i.e. the Northern Cape through to the western part of the Eastern Cape), the use of nets decline steadily while the use of lines is always above 80 percent. The use of traps in the same regions show a range between 0 (region D) and 67 percent (region B), though it is important to bear in mind the fisheries harvested in different regions, which could account for the choice of fishing method. In regions E-H (i.e. the Eastern Cape to Kwazulu Natal), far less usage of traps is present, while the use of lines is closer to 90 percent. It should be noted that all methods – nets, traps and lines – have a low capital intensity, and in the case of traps and nets, are often hand-made. Boats used by subsistence communities, on the other hand, are a far more capital-intensive item. In the table above, we can see that there is a distinct regional bias to the use of boats, which is most prevalent in the Northern and Western Cape. Within these regions, the numbers of boats with motors varies considerably, and most communities report that more than 50 percent of their fleet have motors.

The tools used by fisher-folk are most often a combination of those made at home as well as bought, though the distribution of responses to these questions vary widely. However, the percentage of responses to these questions within the same region is problematic to interpret because they suggest a degree of overlap that is not reflected in the data (e.g. in Region A, there should be a greater percentage of people in the Combination column given the percentages in the two columns preceding it). We should therefore view the responses as mutually exclusive categories and accept a degree of error in the data. That being the case, we can see that a large percentage of the entire population make their own tools, which attests to their skills and ingenuity.

We can thus conclude that capital is scarce in subsistence communities, and most people are forced to improvise in some way. Thus, when considering the impact of an income transfer on these communities, we can immediately see how those who presently have greater access to capital (particularly boats) within the *q* population (i.e. those in regions A-D in the above table) will disproportionately benefit in the short-term. However, the medium to long-term implications are less certain because several variables interact concomitantly to shape the possible outcomes (leaving aside environmental constraints at this point). Some of the factors that should be borne in mind include:

- The consumption needs of individuals, which may dictate that any extra income be utilised primarily to smooth consumption patterns.
- The capacity of communities to invest the extra income in some form of capital (e.g. extra nets, second-hand boats or diving equipment), thereby inducing a parallel, outward shift in their production possibility frontiers (PPF).
- The ability of communities to cultivate (micro) economies of scope (e.g. through eco-tourism or aquaculture (i.e. fish-farming)).

Although we cannot simulate the effects of these behavioural characteristics given our present data, it would be an interesting and very important contribution to the understanding of the *dynamic* gains or losses associated with a single or repetitive income grant (i.e. Δ_i) in the FGT typology discussed in the previous section. We can therefore see that factor markets cast important constraints on subsistence communities that must be investigated when considering the medium-term implications of resource transfers.

We now turn our attention to product markets so that we may examine some of the locational constraints to subsistence fishing.

Product Markets

It is important to understand the constraints posed by product markets when dealing with any informal economic activity because it provides us with insight into the factors that may help or hinder further income generation activities through micro-enterprise development for example. The table below provides us with such information about the subsistence-fishing sector. It should once more be noted that here, again, the columns should be treated as mutually exclusive.

Table 11: Insight into Product Markets from SFTG Sample

Region	Mean % Catch Sold	Self sale (%) (1)	Sale to buyer (%) (2)	Ratio of (1) to (2)	Sold in Community (%)	Sold Nearby (%) (<20 km away)	Sold far away (%) (>20 km)
A	26	63	38	1.66	75	25	25
B	70	83	67	1.24	72	56	17
C	41	71	76	0.93	76	47	24
D	53	90	86	1.05	100	71	0
E	27	86	41	2.1	95	45	9
F	26	94	72	1.31	100	50	6
G	40	100	8	12.5	100	46	8
H	25	59	24	2.46	65	47	18

SOURCE: Clark, 2000, 7; Own Calculations

From the table it is firstly prudent to note that the mean percentage of catch sold in subsistence communities ranges from 25 percent in region H (Kwazulu Natal) to 70 percent in region B (Western Cape), though the majority of regions sell less than 50 percent of their catch. Here, the greater the percentage catch sold, the less is absorbed by home consumption and the more fisheries can contribute to income (and saving) levels.

The ratio of the self-sale and sale to buyer columns gives us an indication of the exposure of communities to buyers, who may have specific standards or criteria that must be met before agreeing to a sale. It is therefore an important indicator of whether subsistence fishers can comply with the sanitary and other standards required by buyers. In the ratio column in Table 12, a figure greater than one implies that self-sale is more frequent than selling to a buyer, a figure equal to one implies a similar frequency between the two categories, while a figure less than one (but greater than zero) implies that sale to a buyer is more frequent than self-sale. We can see that only in one community – region C (Western Cape) – is a greater percentage of the catch sold to a buyer. However, region D, B and F all have figures close to one, thus suggesting that subsistence communities do have access to networks of agents that may be able to purchase more fish from these communities if they had access to greater quantities of resources.

Finally, the last three columns provide us with insight into the locational aspects of product markets in subsistence communities. As is to be expected, by far the majority of regions either sell in the community or nearby. While fishers in most regions do sell a low percentage of their catch far away, the importance of local demand to the sample is clear. It should also be noted that in those regions with lower levels of physical and / or economic infrastructure, we can expect more prohibitive barriers to selling further away from home. The data supports this view, witnessed in the corresponding values for regions D-G (i.e. the eastern part of the Western Cape, stretching across the former Transkei coast and into Kwazulu Natal).

We can therefore conclude that subsistence fishers are not mobile individuals, and that any consideration of linking income transfers to micro-enterprise development would need to be fairly sensitive to the geographical constraints to which communities were subjected to. Furthermore, any such consideration would need to profile the local (upstream) supply chain and the nature of patron-client relationships that exist between subsistence fishers and the buyer networks that purchase fish from them.

Value Creation or Value Destruction in Subsistence Fishing?

From a public policy perspective, deciding on the quantity of resources (income transfers) to allocate to subsistence (informal sector) communities and/or micro enterprises provides policy makers with an interesting dilemma: should a greater or lesser resource transfer be authorised? It is important to note that, in this case, subsistence fishers and micro-enterprises could never generate returns anywhere close to that able by commercial enterprises. In fisheries, this value loss can be quantified by the difference between landed values and FOB wholesale processed values. To aid the discussion, we reproduce the unit differences per fishery presented in Table 4 (above).

Table 12: Value Differences for Various Fisheries

Fishery	R/kg [LV/L]	R/kg [FOB/L]	Ratio (FOB/L : LV/V)
Abalone	21.50	87.75	4.08
Handline Fishing	5.83	7.14	1.23
Mussels (rock/sand)	-	9.64	-
Oysters	3.22	8.94	2.78
Prawns (sand/mud)	-	33.40	-
Redbait	-	6.00	-
WCRL	29.19	65.19	2.23
Seaweed (other)	1.15	3.37	2.93
Small net fishing	1.58	2.91	1.85
Squid	8.50	15.00	1.76

From the table it is possible to see that, in several fisheries, the wholesale processed value is at least double the landed value, and in the case of Abalone the figure is over four times greater. The loss in value terms therefore corresponds to these ratios, which are material indeed. It follows then that the greater the percentage of resources allocated to subsistence communities, the lower the potential realisable value of those fisheries. However, this need not necessarily be the case, especially if linkages to upstream processors are fostered. Obviously, this will be dependent on the location of subsistence communities and their proximity to commercial processing plants.

Linking this discussion to micro-enterprises, we can therefore conclude from the analysis that the prospects for micro-enterprise development in the communities are subject to a range of factors, including:

1. Endowments of biological resources and physical infrastructure.
2. Access to capital – particularly boats – to ensure that greater quantities of resources are harvested.
3. Efficiency of capital (particularly home-made tools), *viz.* enabling harvesting to be undertaken consistently over time.
4. Range of product markets, i.e. whether enterprise sells in community, nearby or far away.
5. Exposure of the enterprise to business networks and client-oriented standards (*viz.* cleanliness, quality, etc).
6. Prices realised for the sale of fish.
7. Linkages to upstream processing activities.
8. Capacity to re-invest income earned.
9. Ability to diversify out of fishing and into related activities (e.g. eco-tourism).

CONCLUSION

We have shown in this paper that it is possible to use the FGT class of poverty measures to understand how income transfers (expressed in values of fisheries) affect subsistence fishing communities. Here, we saw that poverty in subsistence communities can be entirely eradicated (relative to the poverty line) by allocating a proportion of the total allowable commercial catch of known subsistence fisheries to these communities. It should now also be possible to see that the nature of the income transfer (Δ_i) allows for the FGT class of poverty measures to be linked to any poverty alleviation strategy in any sector – whether a welfare grant to pensioners or a micro-finance scheme in the mining sector. The critical ingredients, however, are to obtain data (preferably longitudinal) on the sample population and to understand how a given income transfer is manifest within the case under study. Once this is established, more detailed analyses on the nature of the transfer (which, in the private sector, will more often than not be multiplicative) and its effect on the poor population can be undertaken.

An analysis of the post-income transfer effects in subsistence communities then suggested that several important consequences had occurred. By focussing on inequality levels, we were able to quantify how a multiplicative transfer affects income among poor individuals, noting that they increased proportional to the income transfer and the number of poor agents above R0.00. We then extended the discussion by evaluating product and factor markets, which allowed us to consider which communities would have the greatest propensity to start viable micro-enterprises and so be the greatest beneficiaries of the income transfer. Here it became clear that those communities in the Northern and Western Cape (and to a lesser extent Kwazulu Natal) who had greater access to capital, greater exposure to the purchasing criteria of buyers, and closer ties to business networks had the greatest propensity to succeed relative to those located on the Eastern Cape coastline who were more isolated. Lastly, an analysis of the potential value implications of a fisheries transfer to subsistence communities revealed that, without supplementary support, these communities will find it very difficult to reduce their dependency on fishing and start viable micro-enterprises. In this regard, it was suggested that planning efforts should concentrate on related coastal activities such as eco-tourism, where many communities could use their existing skills to their benefit.

The merits of an income transfer using fisheries are therefore great indeed, though the sustainability of the sector as a source of income is subject to considerable doubt. Despite this, it should be unequivocally stated that fisheries can be used to alleviate poverty in a manner that has been greater than in the past without necessarily compromising the potential realisable value of those fisheries. It also has a very important role to play in uplifting coastal communities and catalysing local economic development, especially given the skills and experiences of these communities in the sector. However, it is clear that due regard must be given to supplementary forms of assistance, for reliance on fishing alone would entrench dependency on finite resources with exhaustible limits without providing these communities with the skills necessary to (ultimately) take their knowledge outside of fishing and into other activities.

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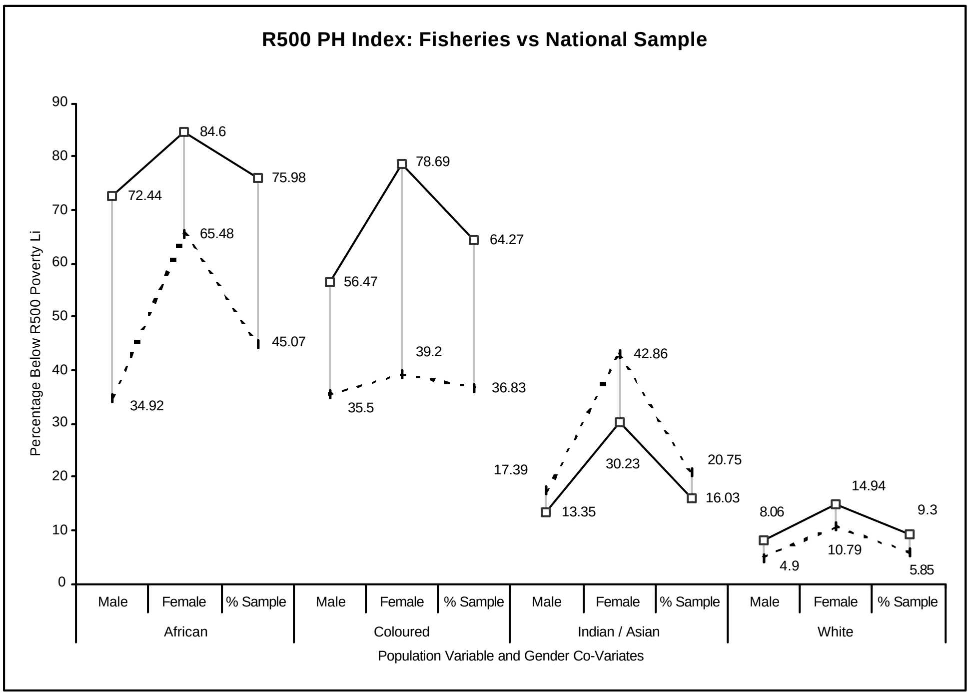
APPENDICES

Appendix 1: The R500 Poverty Headcount Index

Variables		% Below Poverty Line: R500 SFTG Sample	% Below Poverty Line: R500 National Sample
African	Male	34.92	72.44
	Female	65.48	84.6
	% Sample	**45.07**	**75.98**
Coloured	Male	35.5	56.47
	Female	39.2	78.69
	% Sample	**36.83**	**64.27**
Indian / Asian	Male	17.39	13.35
	Female	42.86	30.23
	% Sample	**20.75**	**16.03**
White	Male	4.9	8.06
	Female	10.79	14.94
	% Sample	**5.85**	**9.3**

Distributional Characteristics of Samples at R500 Poverty Line



Appendix 2: Unweighted Poverty Gaps

Poverty Gaps (R1000) and Expenditure Required for SFTG Sample in OHS95

Co-Variate		n	q	P_1 Weighted	nzP1	Exp. p.a. (nzP1)	% of Total Exp.
Consolidated Tota		**1519**	**684**	**0.2972**	**451446.8**	**5417362**	**99.99**
African	**Sub-Total**	**496**	**337**	**0.1626**	**247008**	**2964096**	**54.71475**
	Male	265	162	0.0731	111114.5	1333374	24.61298
	Female	231	175	0.0895	135897.3	1630767.6	30.10261
Coloured	**Sub-Total**	**563**	**292**	**0.1128**	**171377.2**	**2056526.4**	**37.96177**
	Male	292	131	0.0436	66225.6	794707.2	14.66963
	Female	271	161	0.0692	105175.1	1262101.2	23.29734
Indian / Asian	**Sub-Total**	**37**	**3**	**0.0004**	**677.1**	**8125.2**	**0.149984**
	Male	20	2	0.0002	278	3336	0.06158
	Female	17	1	0.0003	399.5	4794	0.088493
White	**Sub-Total**	**423**	**52**	**0.0213**	**32359.5**	**388314**	**7.167954**
	Male	241	17	0.0064	9736.4	116836.8	2.15671
	Female	182	35	0.0149	22640.8	271689.6	5.015164