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1. Introduction

According to the 1982 Census, well over 3 million rural people in Zimbabwe, close to 60 percent of the total rural population, lived in densities exceeding 25 people per square kilometer. Over 70 percent of the rural population also reside on lands with marginal to very poor agricultural potential. According to FAO, rural densities of this magnitude on lands with marginal to poor potential for agriculture will adversely affect the carrying capacity of land resources and consequently lead to severe land degradation and depletion of fauna and flora (Mascarenhas 1983). Such levels of land use pressure have been already surpassed by various orders of magnitude in large portions of rural Zimbabwe and conditions are worsening with rapid population growth especially on Communal Areas (CAs) of the country (Riddell 1978; Barnes and Clatworty 1976; GOZ 1982, p. 54).

The principal objectives of this paper is to demonstrate that land use pressure and related problems in Zimbabwe's CAs are largely the outcome of adverse consequences of distributional incongruity in space (DIS) between population density and land potential. DIS is defined as a phenomenon in which the distributional density in space of any given factor is negatively correlated with that of population. The most important of such incongruities in Sub-Saharan Africa (SSA) is that based on land potential and it refers to a situation in which rural populations reside in higher densities on lands with marginal to poor endowments and potential while lands with richer endowments and superior potential with much lower population densities are present within the nation. When DIS is analyzed within the context of carrying capacity, population density differentials between lands of differing endowments and potential may be expressed in relative rather absolute levels. In carrying capacity terms, lands may be considered overpopulated even though they may experience population densities lower than other lands with higher potentials (FAO 1978). But in the case of Zimbabwe, higher population densities in fact prevail in poorly endowed CAs.

A major factor in this dichotomous people-land relation was the colonial division of the country into two principal territorial domains: (1) high density Tribal Trust Lands (TTLs) in areas with poor potential and low carrying capacity, and (2) low density settler lands with superior agricultural and raw material potential (Palmer 1977; Riddell 1978; Denoon 1983, pp. 94-124; Moyo 1986). Because of this situation, spatial incongruity between people and land became one of the most important problems of rural development in Zimbabwe's CAs. Although the phenomenon of DIS is not particularly unique to Zimbabwe (Lele and Stone 1989, pp. 21-38), the Zimbabwe variant differs from other SSA types in three important respects. First, whereas in many SSA countries DIS has been largely the result of spontaneous and voluntary avoidance of some regions because of their shortcomings in physical factors, in Zimbabwe, with the exception of lands adjoining the Zambezi (Stamp and Morgan 1972, pp. 349-351; Whitsun Foundation 1980, p. 22), it was almost exclusively the result of deliberate colonial land apportionment policies (Palmer 1977; Martin and Johnson 1981). Second, DIS in Zimbabwe is pervasive and affects the opportunities for development and life chances of all populations throughout the country whereas in other SSA countries, except South Africa, it is often a localized problem affecting

only a segment of the population (Lele and Stone 1989, pp. 21-38; Mehretu 1982, p. 3). Third, in Zimbabwe, DIS for land is spatially covariant with patterns of DIS in agricultural technology, mineral wealth, manufacturing, commerce, social overhead capital especially transport infrastructure and urbanization (CSO 1989, pp. 9, 10, 13; Whitsun Foundation 1980, 1981). Because of these fundamental differences between Zimbabwe and most other countries in SSA, whereas the search for new lands in often a question of removing certain cultural or physical barriers to redress land-based DIS (Hunter 1970), in Zimbabwe, the issue of additional land for CAs takes a more complex set of strategies with political as well as technological implications.

The process of DIS in Zimbabwe was a result of a series of colonial undertakings most important of which were: (1) territorial separation of Zimbabwe into settler and communal lands, and associated dualized economies, institutions and overall opportunities for development, (2) disruption of communal peoples by their periodic removal and resettlement on TTLs for the purpose of land appropriation (Myers and Ames 1984; Whitsun 1980, pp. 15-17), (3) the creation of very high population densities in CAs in order to afford cheap labor reserves for exploitation in adjoining settler lands (Arrighi 1970; Weiner et al. 1985), (4) balkanization of communal territories and the marginalization of their agricultural enterprise in both location as well as land potential (Barnes and Clatworthy 1976; Mhlanga 1982; Whitsun 1981, pp. 6-9), (5) the control of movement of communal populations and curtailment of their interactions not only with settler lands, except in the labor nexus, but also within CAs (Arrighi 1970; Dankwerts 1976; Mutambirwa 1990; Reid 1976; Whitsun Foundation 1980), and finally (6) the polarization of all development processes causing their concentration in GLs while CA economies remained in subsistence mode with no diversification and with extremely minimal formation and function of central places and related social infrastructure (Whitsun Foundation 1980; Norman 1986, pp. 1-4; Mutambirwa, 1990). Many Sub-Saharan African countries have also experienced similar undertakings but nowhere had resultant DIS been achieved to the same degree of dualized polarity as in Zimbabwe and South Africa.

There are two specific objectives in this study and they are: (1) an analysis of DIS patterns and their differential impact on development potentials for CAs and for General Lands (GLs) in which are included large scale commercial farms, and (2) an outline of an approach for an integrated plan to redress spatial polarities created by DIS. The paper is organized around three principal postulates. First, DIS in Zimbabwe has caused fragmentation and marginalization of CAs forcing them to occupy inferior lands with higher *absolute* rural population densities while enabling GLs to cover contiguous with superior potential at much lower *absolute* population densities. Second, DIS has caused dualized spatial polarities with mutual exclusivity between CA and GL domains measured in terms of bivariate dimensions of population density and land potential. This means that DCs are primarily characterized by high density rural settlements on lands of inferior potential whereas RCs are characterized by low density settlements on lands of superior potential. Third, land use pressure resulting from polarized DIS has caused severe land degradation in CAs (Kay 1975; Stocking and Elwell 1973; Whitlow 1980, 1988a).

Population and area data for this analysis are drawn from Central Statistical Office (CSO) compilations of the 1982 census by Enumeration Areas (EAs), District Councils

(DCs) and Rural Councils (RCs) (CSO 1990). Area estimates for natural regions in DCs and RCs are based on author's compilation from map overlays (Surveyor General 1984, 1988). In order to afford use and comparability of data, I shall also use CSO data aggregates for DCs and RCs (CSO 1990) to represent conditions in CAs and GLs respectively. This should not cause any problem as both sets of nomenclature refer more or less to the same territorial divisions of rural Zimbabwe (Surveyor General 1988). Municipalities, National Parks and State Lands are excluded from the analysis.

1. Settlement Densification and Locational Marginalization of CAs

One of the earliest and most negative outcomes of the DIS process in Zimbabwe was settlement densification. Table 1 is illustrative of the density differentials between CAs (DCs) and GLs (RCs). Overall, according to the 1982 Census (CSO 1990), 73.3 percent of the rural population resided in DCs on just about half of the rural land surface (see also CSO 1989, p. 2). Column 2 of Table 1 contains an intuitive and relative nominal scale to summarize the various classes of density. Using this scale, it can be observed from columns 5 (for DCs) and 9 (for RCs) that whereas over 60 percent of DC population resided in highly stressed lands with densities higher than 30 people per square kilometer, only about 14 percent of RC population was in this category. On the other hand, almost 60 percent of the RC population was located in "low density" categories, while only a mere 8.5 percent of the DC population was in "low density" conditions. It can also be observed that 16.5 percent of DC population resided in densities exceeding 49 people per square kilometer whereas no rural settlements in RCs reached this level of stress. The degree of disparity is also evidenced by comparing column 4 for DC populations with column 8 for RC populations. Whereas the number of people in DCs generally rose with increasing density classes, those of RCs declined.

The second important outcome of the colonial process of DIS in Zimbabwe relates to the fragmentation and marginalization of CAs in geographic location and land potential. The locational marginalization of DCs is shown by 20 of the 55 DCs being located at the remote extremities of the nation along the country's boundary with Zambia, Mozambique, South Africa and Botswana. The 55 DCs are also broken up into about 30 discontiguous territorial units. On the contrary, RCs dominate the interior of the country covering contiguous terrain stretching from the southwest to the northeast including regions adjoining the mineral rich Great Dyke. The only peripheral RCs with a significant stretch along a boundary are those found in the majestic Eastern Highlands which not only receive the highest level of precipitation in the country but also they are rich in natural vegetation, agricultural potential and scenic beauty.

Marginalization of DCs with respect to land potential is evidenced by Table 2 which shows DC and RC population and land distributions based on the five Natural Regions (NRs) into which the whole country is divided (Surveyor General 1984; Whitsun Foundation 1980, pp. 22-23). Using these five NRs, land potential is defined on the basis of effective precipitation. NRs I and II contain lands of high potential suitable for intensive agriculture. NR III lands are rated of marginal potential suitable for semi-intensive agriculture. NRs IV and V are of low potential and can only support extensive farming in combination with livestock (Surveyor General 1984; Whitsun Foundation 1980, pp. 22-23).

To begin with, there is the quantitative disparity between DCs and RCs in the amount of land allocated to each in comparison with population size. As shown in columns 3 and 5 for DCs, and 8 and 10 for RCs on Table 2, the inequitable legacy of the 1969 Land Tenure Act, which divided the country's land (except a small portion held as National Land) equally among the communal and settler populations along what was known as "parity", is demonstrated. At the time, the settler population was only about 5 percent of the total but it not only took half of the country's rural lands but also those with the best potentials, least fragmented and most accessible. Currently, about 4000 large-scale commercial farmers (most of European origin) hold most CA land in which 26.7 percent of the rural population resides. The basic structure of land ownership has changed little from its colonial mode. The quantitative inequity notwithstanding, the process of DIS has also seriously aggravated carrying capacity constraints by allocating land with very poor potential to DCs.

As shown on column 10 of Table 2, RCs occupy 90.4 percent and 72.6 percent of NRs I and II respectively. RCs also cover about 55 percent of NR III. It is only in the most unproductive regions of the country, NRs IV and V, where DCs have over 72 percent of their land area and over 62 percent of their population (column 3, Table 2) (see also Whitsun Foundation 1981, p. 7). But even here, per capita land ownership in DCs is much lower than that of RCs (compare columns 3 and 5 (DCs) with 8 and 10 (RCs) in Table 2).

The density differentials between DCs and RCs by NR divisions are also shown on Table 2. Although the density figures shown in columns 6 and 11 follow normative trends, declining with decreasing land potential *within* DCs or RCs (a sign of rational response to land potential), it is the density differences *between* DCs and RCs that are the most disturbing. First, the density figures by NRs for DCs range from 3 to four times the densities for RCs. Second, density functions by NR have variant slopes for DCs and RCs. Whereas on RC land population density declined to a fifth of its highest level on NR I; on DC land, it declined only to a third of its highest level on NR I. Third, DC densities on NR V land are higher than RC densities on NR II land and almost equal to NR densities on NR I (columns 5 and 11)! These results corroborate the first postulate of the paper relating to dichotomies between DC and RC domains in territorial integration, land potential and population density.

3. Spatial Polarization between DCs and RCs

Tables 3 to 8 are demonstrative of the pattern of distribution of population and land in DCs and RCs along two dimensions of population density and land potential. In the bivariate distributional matrix, increasing density classes are scaled on rows and decreasing levels of land potential using the five NRs are scaled on columns. Tables 3 and 4 are distributions of DC and RC population data on the bivariate matrix. They demonstrate severe DIS. Table 3 shows that most DC populations are concentrated in the "poor" southeast sector of the bivariate matrix where densities are higher and land potential low. On the other hand, virtually all RC populations are located in the "rich" northwest sector of the matrix where densities are lower and land potential high. The row and column totals and percentage figures for each of the DC and RC populations, which are based on the combined DC and RC totals in the respective categories, indicate that DC and RC distributions on the bivariate axes are diametrically contrasted on both dimensions of density

and land potential with DCs in exceedingly high land stress (Tables 3 and 4).

Tables 5 and 6, which represent DC and RC data arrays respectively for land distribution on the same bivariate matrix reveal the same pattern as Tables 3 and 4. Most DC land is found in the "poor" sector of the matrix while nearly all RC land is in the "rich" sector. The row and column totals and percent figures for each of the DCs and RCs are once again negatively related. For DCs, percentages of land rise on the increasing population density dimension, and they also rise on the declining land potential scale. For RCs, exactly the opposite pattern applies (Tables 5 and 6).

Although Tables 3 to 6 offer a pretty good idea of the degree of the DIS in Zimbabwe, distributional polarity and territorial mutual exclusivity between DC and RC domains have not been measured. Within the same conceptual rubric of bivariate separation, by these two terms it is meant that RC domain in the "rich" sector of the data array would contain little or no representation of DC data, and by the same token the DC domain in the "poor" sector would contain no data on RCs. In order to test this, the RC land data array as shown on Table 6 was subtracted from the DC land array (Table 5). This produced Table 7 in which cell values with negative signs indicate RC land holdings in excess of those of DCs. Positive cell values represent DC holdings in excess of those of RCs. A boundary line which separates negative (RC) values and positive (DC) values has been drawn on Table 7 to indicate the mode of separation and polarity between the two domains. Table 7 clearly indicates that there is a definite pattern of distributional polarity as postulated earlier.

In order to see if there is mutual exclusivity in DC/RC bivariate distributional patterns, a matrix of indices for mutual exclusivity were calculated. To get the indices for RC domain, cell values in Table 7 were divided by corresponding domain cell values in Table 6, and this procedure produced a ratio of RC excess land divided by RC total land (Table 7). The same procedure was applied to the DC domain using Tables 5 and 7. Table 8 is the result of this procedure. All cells northwest of the "diagonal" boundary on Table 8 are those cells in Table 7 for which RCs have excess land over DCs. Those to the southeast of the diagonal are cells in Table 7 for which DCs have excess land over RCs. The negative signs for RC cells are relics of the computation for Table 7 and also serve as labels for cells in RC domain. Cell values in Table 8 range between unity (ignoring sign) and 0. For example, a value of unity (ignoring sign) in a cell in the RC domain means, in that cell, RC excess land is 100 percent of all land in that bivariate category in rural Zimbabwe, meaning that there is mutual exclusivity in that cell between DCs and RCs. Values of zero or approaching zero mean that in those cells DCs and RCs share the land equally. The pattern on Table 8 indicates that with the exception of two "rich" domain cells in the medium density classes in NR II, all other cell ratios in both RC and DC sectors are or approach unity. This confirms the second postulate posed on mutual exclusivity between DCs and RCs in the distributional bivariate matrix resulting from DIS.

Table 8 is indicative of a highly effective and successful application of the six colonial impacts discussed above to achieve a most polarized DIS pattern in Zimbabwe. Rural development planning in Zimbabwe, especially one that puts primary focus on CAs, has to begin with the realization of this two-pronged problem. It also has to consider the adverse consequences of this bivariate DIS on CA development in concatenation with other DISs

such as those based on advanced agriculture, mineral wealth, manufacturing, urbanization and social overhead capital.

Such bivariate differentiation of communal and settler domain is the principal structural feature of a colonial economy of the settler state (Denoon 1983, pp. 17-42, 94-124; Mehretu 1989, pp. 15-36). Where it developed to an advanced stage such as in Zimbabwe and South Africa, it has left injurious externalities in the social, political, economic and environmental characteristics of the communal domain. The "rich"/"poor" spatial dichotomy on the bivariate matrix along with the high degree of mutual exclusivity between RC and DC domains exemplified by Tables 5 and 6 was invariably the basis of this externality. Although the social, political and economic externalities of DIS are no less important, the gravity of the process of irreversible degradation in CAs makes land use pressure a more urgent agenda for rural development.

4. Environmental Externalities of DIS

Zimbabwe's DIS has produced many negative outcomes the effects of which continue to be major constraints for broad-based development efforts for CAs (Jackson and Collier 1988; GOZ 1981, 1982). One of its most serious consequences, and a problem that has attracted considerable research, is the high land use pressure and land degradation which most CAs experience (Marchand 1989; Kay 1975; Stocking and Elwell 1973; Elwell 1985; Whitlow 1980, 1988a, 1988b; Nyamaphene 1982). Land use pressure in Zimbabwe has been shown to be at its highest when high population density and poor land potential concatenate (Kay 1975; CSO 1989, p. 2). Although this has generally been the fate of all CAs, stress differences have existed within CAs with some under extreme pressure. For instance, eight DCs, namely Mudzi, Hlangabeza, Insiza, Umzingwane, Mberengwa, Zvishavane, Batanai and Nyaningwe illustrate the negative outcome of DIS with severe land use pressure (Kay 1975). These DCs are entirely in NR IV and or V while experiencing a "high" mean population density of about 35 people per square kilometer (CSO 1989, p. 2), twice the density that RCs experience in NR II. Furthermore, 20 out of the 55 DCs with 50 percent or more of their area within NRs IV and V, also experience high land use pressure with a mean of about 38 persons per square kilometer and fall in the categories of what Kay (1975) called "desperate pressure" and "great pressure." What makes this a serious national problem for land use enterprises and sustainability is that these 20 DCs contain 47 percent of total DC population. With existing technologies in CA agriculture, this means the carrying capacity of these lands has been surpassed by various orders of magnitude (Reynolds 1982; Mascarenhas 1983; Lipton 1990).

In the subsistence mode, settlements with high population densities and/or low land potentials are associated with higher magnitudes of erosion. A look at erosion research in Zimbabwe (Elwell 1985; Stocking and Elwell 1973; Whitlow 1988a, p. 25) with reference to DC/RC distributions on the bivariate matrix corroborates this phenomenon as there is a clear pattern of spatial covariance between land use pressure and land degradation. About a third of the 55 DCs are "affected by erosion" on over 12 percent of their land (Whitlow 1988a, p. 25) and they are all located in the "poor" sector of the bivariate matrix. They include DCs with low to medium population densities but located in NRs IV and V (eg. Gwanda, UMP Zvatadia, Mudzi and Pfura), DCs with high population densities but located

in NRs II and III (lands of good potential, at least in terms of precipitation, if not neutralized by domed inslebergs (Mhlanga 1982)) (eg. Maungwe, Kubatana Bindura, Chirorodziva (Chirau and Zwimba CAs), Chiweshe and Goromonzi Kubatana), and DCs with both high population density and low land potential in NRs IV and V (eg. Bikita Peoples, Zaka, Mutare, Nyaningwe, Batanai and Buhera) (see CSO 1989, p. 2). Research on deforestation (Whitsun Foundation 1981; Whitlow 1988b) and overgrazing (Mhlanga 1982) indicates almost similar patterns of distribution, most critical cases being located in the "poor" sector of the bivariate schedule.

The negative impact of colonial DIS on CA populations was shown with ample evidence since early colonial times (McIlwaine 1943; Kay 1970; Dankwerts 1976), but no serious attempts have been made to reverse the process. In fact it worsened by the various land apportionment schemes that allotted less land to communal use in marginal areas until urgent conditions were reached in the late 1940s (Whitsun Foundation 1980, p. 15). African farmers practised various forms of traditional conservation measures in precolonial days depending on the nature of the physical constraints of their land (Mpofu 1987), but the pressures created by processes of DIS were too difficult for their traditional solutions (Mhlanga 1982). By the eve of independence, CAs had reached serious conditions of degradation that even the colonial administration was beginning to be worried. In a revealing editorial, Dankwerts (1976) bemoaned the "low productivity and high rate of destruction of tribal natural resources" and the lack of contribution by agricultural and other scientists to the solution of problems in the TTLs (see also Reid 1976). It was indicated that although the urgency of the problem has been aired by many and at various forums, nothing significant has been done to reduce the stress on CAs (Dankwerts 1976).

While the malaise on CAs were primarily the result of DIS, pre-independence literature on problems of CA land stewardship largely ignored this phenomenon and mostly worried about the symptoms manifested in CAs. As Reid (1976) pointed out, often the situation on CA lands was blamed on the "irrationality" and "lack of motivation" of the "tribal people" and "mismanagement practices" on their lands (see also Barnes and Clatworthy 1976, p. 274; Ivy 1985). It was reasoned, of course, that first, the Rhodesian scientists did not see themselves as responsible to the needs of the CAs and almost all of their contribution went to benefit the "modern farmers" to which they were held accountable (Dankwerts 1976). It was also thought that the colonial expertise in agriculture lacked the necessary knowledge base to assist the CA sector in any meaningful way (Reid 1976).

All such rationalization ignored the fact that before DIS processes were set in motion, communal agriculture was not only more efficient but also exceedingly more productive than the settler sector (Myers and Ames 1984, pp. 88-90; Mhlanga 1982, p. 280). As Reid (1976, p. 269) also pointed out "the tribal farmer is a better indigenous economist that most Europeans including ... trained and capable agricultural economists." Ames and Myers (1986, p. 88) also point out that European farmers "produced yields inferior to those of the African peasants until After World War II." In terms of land stewardship precolonial communal land use was stable with "no noticeable land degradation" because of the abundance of land and the use of shifting cultivation in both Shona and Ndebele regions (Mpofu 1987, p. 2; Mhlanga 1982). Therefore, the fundamental problems of CA development did not originate in shortcomings with the African farmers. They were

primarily caused by DIS which laid the foundation for other DISs, all together earmarked to buttress the settler economy at the expense of the communal (Arrighi 1970; Palmer 1977; Martin and Johnson 1981, pp. 51-72; Whitlow 1988a, p. 9). Policies and options for the redevelopment of CAs must therefore begin with the realization of this fundamental problem.

5. Directions for Sustainable Land Use in CAs

The negative impact of DIS on CAs is a form of externality inflicted by historical developments of GLs along social, political, economic and environmental dimensions. The political economy of GL development disrupted the integrity of the family and society on CAs (Kay 1970, p. 67; Mhlanga 1982), it neutralized the political role of CA populations (Martin and Johnson 1981, pp. 51-72), it reduced CA economy to a labor reserve sustained by marginal subsistence (Arrighi 1970; Weiner et al. 1985, pp. 254-256) and, finally, it pushed CA land to the limits of its ability by forcing high population density on marginal land which consequently led to severe degradation (Elwell 1985; Kay 1975; Whitlow 1988a). While some successes have been recorded for CA agriculture (Norman 1986; Bratton 1986; Rohrbach 1988; Rohrbach et al. 1990), fundamental structures of DIS have constrained sustainable utilization of land resources and their stewardship for perpetuity.

CA land stress may have outward manifestations of exceeding Malthusian limits on land frontiers without having made appropriate shifts in technological adjustments following Boserupian logic (Lipton 1990; Pingali 1990; Lele and Stone 1989). However, the Zimbabwe experience is very different in this regard when compared to other SSA countries. First, Malthusian limits in land were artificial and were deliberately imposed on CAs to create high density labor reserves and subsistence agriculture on marginal lands (see also Pingali 1990, p. 256). Second, land use intensity (shortening or eliminating fallow cycles) in CAs was not a result of spontaneous Boserupian shifts from land extensive margins to land intensive margins as the theory provides (Boserup 1981). It was primarily an outcome of forced densification in which CA farmers resorted to "soil mining" to eke out subsistence using traditional technology not suited to the level of land use pressure they had to deal with (see Lipton 1990, p. 224; Reynolds 1982).

The resolution of the marginalization of CAs resulting from chronic DIS would require an approach that is comprehensive and multidisciplinary as it touches virtually all aspects of communal life (see SADCC 1988, pp. 1-2; Pilim 1990) but the land question is central to any form of redress. As I mentioned in the introduction above, a principal problem that constrains the overall development process in CAs is the curtailment of symbiotic relations in economic, environmental, political and social factors between the two principal territorial domains created by DIS. In colonial Zimbabwe, what happened on any of these factors in CAs was of no concern of the GL domain so long as they did not adversely affect the labour nexus and processes in GLs. Although much has been done since independence, the lagged effects of structural DIS largely remain in effect and still continue to pose problems for sustainability in land use enterprises and for improved levels of living in CAs (Mehretu 1989, pp. 31-35).

From the viewpoint of economic geography or environmental economics, what may be required is a comprehensive analytic design for land use policy that will redress DIS and

enable institutional strategies for territorial reintegration of GLs and CAs along economic, environmental, political and social lines (Siebert 1985; Okigbo 1990; Chavunduka 1982). This space will not allow an elaboration of such an approach. I shall simply outline four principal components of an integrated plan of action which, depending on the empirical circumstances in CAs, are applied in appropriate magnitudes to redress the negative externalities of DIS. The four components are: (1) increasing acreage for CA agriculture with options for resettlement for CA stressed lands operating at carrying capacities detrimental to sustainable food security, (2) conservation, reclamation, and sustained yields on CA land resources, (3) infusion of appropriate technological inputs including social infrastructure and (4) increasing the non-farm small enterprise sector in the short run and expanding more advanced secondary and tertiary activities along with urban functions in CAs.

The land issue partly involves current ownership patterns in CAs with future implications for cadastral surveys and land titles that may be needed to advance proper land resource stewardship. But the most urgent problem at hand is its implication on GL land for resettlement purposes. While there are many problems associated with this on both CA and GL domains (Due 1986; Weiner et al. 1985; Cliffe 1988, pp. 13-24), there are CA cases in which it is absolutely essential to apply it to relieve gravely stressed lands. Since the process of DIS has caused communal settlements in locationally peripheral and low potential regions at too high population densities, application of the other developmental components while this situation prevails would be meaningless for sustainable land use (see also Lipton 1990). A carefully planned settlement project that integrates the other three components in its design will have to be applied in some cases beginning with pockets of gravely stressed CAs in all NRs.

The least controversial and perhaps the most important of the four components is the use of conservation programs to advance sustained yield on all land resources and to reclaim degraded ones. Much is already being done in this regard in Zimbabwe by various government departments (GOZ 1987; Reid 1984; Agritex 1989). But, witnessing the level of gully erosion in places like Mhondoro and Ngezi, just a short distance from Harare, and ongoing sheet erosion in almost all CAs with a loss of soil between 20 and 100 tones per hectare per year depending on slope and vegetative cover (Elwell 1985; Ivy 1985), and with almost a million hectares of crop land, or close to 3 percent of the DC/RC total area estimated to have been already eroded, with over 90 percent of it in CAs (Whitlow 1988a, p. 43), the situation is far from being sufficiently addressed. Conditions on range lands and forests is similarly alarming (NRB 1982; Whitsun 1981). The current environmental conditions on CA lands being largely negative externalities of highly successful developments in GLs resulting from a history of DIS, the cost of instituting various options for conservation tillage, sustained yield and reclamation of degraded land resources in CAs (Strong 1982; Mapawose 1982) will obviously have to be borne by the State. Together with other components, conservation programs on CAs may also reduce mounting pressures on GL rural and urban localities which are perceived by CA migrants as having much higher employment opportunities than can actually be realized (Mutambirwa 1990).

The third component relates to developments in farming technologies and social infrastructure. Considerable progress has been achieved in this area since independence.

Smallholder production with application of new varieties and other technological packages has experienced remarkable advancement (Rohrback 1988; Rohrbach et al. 1990; Rukuni and Eicher 1987). However, in many CA localities "soil mining" following DIS-related land use pressure may have already damaged lands too severely to be resuscitated by new technologies for sustainable crop enterprise (see also Lipton 1990; Cliffe 1988, pp. 1-12). Conditions in Chirau, Zwimba and Mhondoro CAs point to this problem (Mehretu and Mudimu 1990). Progress in social infrastructure, except in educational and health establishments, has not been remarkable. A short distance from the capital, Mhondoro has among the poorest in transport facilities (CSO 1989, p. 9). The last 30 kilometers on the Beatrice to Mbaira segment take more time than the Harare-Beatrice stretch with almost three times the distance. Mhondoro is not only one of the more proximal CAs to Harare but also perhaps one of the more endowed CAs in land resources. The distribution of surface transport being spatially covariant with that of land-based DIS, principal highways bypass CAs in most areas. The Harare-Nyamapanda, Mutare-Nyanga, Mutare-Masvigo, and Bindura-Mount Darwin segments are precious few exceptions (CSO 1989, p. 9). More recently, the Chinhoi-Chegutu, Murembedzi-Norton and Kwekwe-Gokwe segments have also been improved but the vast stretches of CAs in all parts of the country remain relatively isolated from the more developed domain in GLs (Whitsun Foundation 1980). Because of low incomes, shortage of public transport and lack of diversified secondary and tertiary activities in CAs, even when links such as these are available to CAs, they are of minimal use to them as they are to GA traffic. A cursory observation of traffic on links such as Chinhoi-Chegutu, Mutare-Nyanga, and Mutare-Chipinge (-Chimanimani) confirms this.

The fourth and last component suggested for a comprehensive CA development is progress in the non-farm sector of CAs. As pointed out, one of the negative outcomes of DIS in land and transport is to depress urban dynamics in CAs (Mutambirwa 1990). Before independence, there was little secondary or tertiary activity except what took place in what are called Business Centers (BCs). Most of these have now been earmarked for infusion of development schemes under the Growth Point (GP) and Growth Center (GC) plan of the government (Sibanda 1985; Wekwete 1985). The urban option will be relatively more important for more densely populated and less remote CAs. But to be successful as a "sponge" for surplus population on CAs and to function as local growth poles, urbanization has to enjoy a more integrated market than what prevails at present (see Bendavid-Val 1989). Of special importance to future CA urban dynamics is the development of not only middle-scale manufacturing when possible but also small-scale enterprises whose significance is more important than presently realized (Chuta and Liedholm 1979; Bendavid-Val 1989). The current BC function can also be upgraded to include higher order goods but this requires a much higher market threshold in population as well as in income per capita. Current developments such as in Murembedzi, Murewa, Mutoko and Nyanga are encouraging, but CAs as close as Mhondoro and some as far as Mupfure have feeble urban activities with no more than low-order retail functions with anaemic BCs.

Many express major reservations about the significance of urban functions in contributing as a "sponge" for surplus populations in SSA (Livingstone 1990, pp. 284-287; Lipton 1990, p. 220). The Zimbabwe situation may be even more problematic as the CA sector was left completely devoid of spontaneous urban development and future prospects

are not easy as rural settlements are generally very dispersed in CAs (Davies and Wheeler 1985). Strategies for GPs and GCs have some promise if they are vigorously applied in viable and sustainable modules in association with all the other three components, particularly surface transport, for eventual reintegration of CAs with the rest of the country in social, economic, political and environmental dimensions.

6. Conclusions

Future policy and research for the benefit of CA development should begin by realizing some crucial parameters on land use pressure. First, current land use pressure in CAs are detrimental to sustainable food security and overall development of the CA sector. Second, CA constraints in land and associated negative externalities are direct results of DIS and related processes. Third, solutions to redress DIS and relieve land use pressure in CAs must be found in a comprehensive and integrated strategy that includes the search for "new lands" for CA agriculture, improved stewardship of existing land resources, diffusion of production technology and social infrastructure, and advance urban sector options. DIS is an artifact of colonial land management. It is not a natural outcome of spontaneous processes that resulted from choices and markets. Neither would it be resolved by these same mechanisms. It requires deliberate policies for redress, policies based on research and with objectives of "development without destruction."

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