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Energy studies have been an expanding component or sub-category of Development Studies for well over a decade now; this *Bulletin* explores their treatment of the interactions between energy and poverty. Any description of 'energy studies' would have to grapple with the extreme heterogeneity of the material so defined and, in large part, this is because there are two quite distinct sets of literature — responses to two types of energy crises. These are, of course, the oil price crisis and the biomass crisis. The literature on the first emphasises international trade and balance of payments issues and the linkages to domestic sectors; it is macroeconomic in its policy focus and on the technological front is concerned with conservation of fossil fuels. In stark contrast, the biomass crisis is principally associated with rural domestic woodfuel use; it is typically concerned with analysis at the level of the household and, very often, specifically with the impact of the woodfuel crisis upon poor rural women. Its policy concern is informed by consideration of rural political economy, and its technological front is concerned with the conservation of biomass.

In these terms, a substantial subset of the literature, which focuses on possibilities for substitution out of fossil fuels by use of biomass, and more generally renewable energy technologies, addresses the first crisis. Two of the studies included in this *Bulletin* (Sachs et al. and Greeley) are of this sort, in whole or in part, and together with Collier's article on the macroeconomic effects of oil revenues on poverty in Nigeria offer a treatment of the first crisis. Three of the remaining four articles — by Agarwal, Howes and Wisner — relate specifically to the rural domestic woodfuel (biomass) crisis, while the article by Leach focuses on the urban poor who, more than any other social category, are squeezed by both the oil and biomass crises.

This substantive bifurcation in energy studies suggests quite serious limitations on the utility of 'energy' as an analytic category in the social sciences. No attempt is made here to address this problem but it is as well to recognise that the uniform holistic meaning of the term in the natural sciences confers no specific advantage on the use of the term in the social sciences. This is because the provision of energy services embodied in the provision of different types of goods involves, per rupee or dollar unit value, use of

differently priced sources and amounts of energy operating at different efficiencies. After an initial flush of energy determinism in the 1970s this fact is increasingly being recognised. It means that, typically, key energy indicators such as the energy intensity of GDP, capital investment and food, cannot be sensibly parametrised.

Substitution possibilities between fossil fuels and biomass fuels, and within each category, are of interest because of their total economic implications; energy intensities and costs per unit of energy are a poor guide to these implications. In effect, there is no advantage to be gained by emphasising the commonalities in these two areas of energy study because their chief item in common is of very limited interest to social science. In presenting them together in this *Bulletin*, we are simply recognising the two distinct crises that have prompted current awareness on energy.

The slight relative emphasis here on the biomass crisis rather than the oil crisis reflects the fact that the poorer a country, a region or a household, the more likely it is that the character of the immediate energy constraint will reflect biomass scarcity rather than oil scarcity. Furthermore, as might be expected from the above description of predominant subject matters in the two sets of literature, the biomass literature is much more explicitly directed towards poverty issues. The macroeconomic analysis of adjustment to external shocks, such as the oil price rises, has not been as helpful as might reasonably have been expected in its specific treatment of poverty. There are important exceptions such as recent ODI work on income distribution consequences of stabilisation policies and the UNICEF initiative on adjustment 'with a human face'; however, in general it is the failure of adjustment policies to substantially and directly address poverty considerations which has made their acceptance so difficult politically in many ldc's, and this failure is mirrored in much of the literature, where long-term growth is the principal concern. The Brazilian and Nigerian studies in this *Bulletin*, by Sachs et al. and Collier respectively, though addressing very different situations, are distinctive in that they both provide macro-level analysis of the impact of the oil crisis on poverty.

The seven articles in this *Bulletin* share the common theme of energy-poverty interactions, but each study

employs quite distinct methods. This reflects the multi-faceted nature of this common theme and, in particular, the complexities of policy-formulation in response to the energy crises. The paper by Howes reports on a four-village Bangladesh study, in the Rapid Rural Appraisal genre, of the causes and consequences of and possible solutions to, increasing domestic fuel shortage. The study identifies how differences *between* villages with respect to cropping patterns and proximity to urban centres, and differences *within* villages in terms of differential household land rights and therefore access to biomass, determine which rural people are most severely affected by the increasing scarcity of biomass. The study analyses the ways in which biomass scarcity is widening and deepening, and evaluates three types of possible solution: increased biomass production, improved conversion efficiency and substitution by other fuels.

In her article, Bina Agarwal maintains a South Asian focus and compiles a wide range of survey evidence, chiefly Indian, to describe the increasing severity of the biomass shortage. The main analytic concerns of the paper are two-fold: first, to examine the linkages between domestic fuel shortage, poverty and socio-economic inequality. Secondly, to critically assess the design and operation of programmes introduced to alleviate the biomass crisis. The success of grassroots movements in developing effective poverty-focused responses to biomass scarcity and environmental degradation is contrasted with the government programmes whose top-down design and implementation procedures are identified as critical reasons for their relative failure to benefit the poor despite their stated objectives. Failure of social forestry and other biomass-related programmes to benefit the poor are, it is argued, part of a larger and familiar story; they are the result of a development strategy which reflects commercial needs and which, despite the rhetoric, fails to take account of the needs of the poor.

It is of course no surprise, indeed it is perhaps no more than a truism, to identify the poor as being most severely affected by biomass scarcity. Both Agarwal and Howes are concerned to show the increasing intensity of the domestic fuelwood crisis for the poor and the extent to which the crisis is now a dominant factor affecting their welfare. Wisner's paper, in contrast, emphasises the importance of understanding the specific historical causal mechanisms which have provoked the crisis in order to identify possible policies to circumvent it. His analysis is built on a comparison between Kenya and Lesotho, where rural women face apparently very similar fuelwood crises but which have their roots in completely different phenomena; in the Kenyan case, privatisation of land is the chief culprit, whereas in Lesotho it is the migrant labour system — and its effect on land productivity

and commodity relations — which has resulted, amongst other things, in a similar fuelwood crisis.

Analysis and understanding of these different historical processes of structural change are essential for effective policy formulation. Wisner argues that despite the lip service paid to analysis of causes rather than symptoms, policies have typically been informed by functionalist approaches; i.e. policies (such as improved stove programmes) are designed to restore equilibrium to an essentially stable pattern of livelihood systems. This argument is exemplified in the Kenya-Lesotho comparison where, in the former, the 'project' approach to rural women's development is seen to mesh poorly with the growing number of self-help action programmes rural women organise for themselves, whereas in Lesotho, for structural reasons, such self-organisation is largely absent.

These three articles on rural domestic fuelwood scarcity share a common theoretical perspective in locating their analyses in the realm of rural political economy and focusing upon inequitable asset distribution. They complement each other in together providing: assessment of technical solutions to domestic energy crisis; advocacy of bottom-up organisational approaches to energy-related programmes for rural women; and analysis of the structural factors determining the relevance and viability of such approaches. They are further complemented by Leach's article, which demonstrates the severity of the energy crisis for the urban poor and then focuses on the opportunities to remove the obstacles that result in the poor using inefficient or expensive forms of energy. Given the low income elasticity of demand for cooking fuel, the poor spend a higher proportion of their income on fuel; this difference is accentuated because the poor typically use wood and other fuels which are more expensive than fossil fuels per unit of useful heat. In recognition of this, and in sharp contrast to the prevailing ethos in energy studies which moves against deepening fossil fuel dependence, a major contribution of the Leach paper lies in its analysis of the factors which inhibit the use of the more efficient fossil fuels by the urban poor. This constitutes a very explicit example of the significance of an 'end-user' rather than a 'technology' or a 'primary energy source' based analysis of policy options. A further contribution of the Leach paper is its explicit concern with policy options — such as State regulated woodfuel markets — which are less well debated and analysed than conventional solutions for the problems of poverty and the energy needs of the poor.

The article by Sachs et al. analyses what is undoubtedly the most dramatic national response to the oil crisis, the Brazilian alcohol programme. Liquid fuel from sugarcane, and in particular its use in the motor car, is the principal reason for a 46 per cent

decline in gasoline consumption in Brazil over the last seven years. The authors describe the Brazilian response to the oil crisis as that of a 'war economy' — the enemy being dependence on imported oil. This is a strategic decision based on long-term expectations about the price and availability of fossil fuels and not conditional upon short-term profitability. The authors are not principally concerned with this philosophy of import substitution, and their critique of the programme is not derived from current orthodoxy; rather, their criticism is of the conservatism of a development strategy that was aimed, regardless of cost, to prevent 'dethronement of the car'. The Brazilian alcohol programme represented a chance — indeed was first designed — to benefit the poor by using cassava grown by smallholders on poorer land as the source of feedstock, rather than plantations devoted to sugarcane and using prime food producing land. The article presents a detailed and technically informed review of the severe social, economic and ecological impact of the programme as it developed, but rather than concluding on this negative note they choose to emphasise that — while the large-scale alcohol production programme is not reversible — the opportunities to help the poor through biomass energy strategies remain much as they were before the alcohol programme was initiated. Based on their own research, particularly within the UNU Food-Energy Nexus programme, they outline a set of organising principles for developing these opportunities for a biomass programme. These principles (including, e.g. emphasis on end-user needs and local solutions) relate closely to the ideas discussed by Agarwal and Wisner, but a crucial difference is the explicit emphasis given to biomass resource development as an opportunity for the poor rather than as a necessary response to energy crisis.

This last point is developed in the article by Greeley, which focuses specifically on energy and agriculture interactions. He explores the research initiatives which have been taken in response to the belief that high oil prices would lead to increasing real food prices. It is argued that this belief is subject to very considerable qualification and, critically, that it is too static in its treatment of technology both for the manufacture of energy-using agricultural inputs and for the production of food. As a consequence, and apart from the inherent limitations of the specific research approaches,

none of the three main areas of research reviewed — energy analysis, partial equilibrium models of oil price-food price relations and renewable energy technologies to substitute for fossil fuel use in agriculture — has provided substantive insight into policy formulation on energy-agriculture interactions generally, or in relation to poverty specifically. The paper goes on to suggest that these approaches reflect too static a preoccupation with an energy crisis affecting the poor, via food prices, rather than with the opportunities, in the vein of Sachs et al., that exist for biomass fuel programmes to benefit the poor.

Paul Collier's is article is distinct from the others first in analysing the general equilibrium effects on poverty rather than direct energy use associated effects, and secondly by taking the case of an oil-exporting country — Nigeria. Four pairs of commodity categories — rural and urban labour, consumption and capital formation, tradable and non-tradable goods, public and private revenues — and a simplified set of national accounts supported by various small sectoral surveys, are used to analyse the effects of oil revenues on poverty. The very clear and dramatic message of the analysis is the negative effect on the agriculture sector, with declines in both food and export crop production. The decline in export crops was expected (Dutch disease), though other non-oil tradables, notably manufacturing, acted 'perversely'. However, the decline in food output, in effect a non-tradable to judge by relative domestic and world prices, was not expected. The principal explanation is the role of the State (Nigerian disease) in promoting (actual and expected) urban employment from amongst the mobile agricultural labour force, thereby reducing labour available to produce food. The overall affect on poverty of the substantially higher food prices (a doubling in real terms during the 1970s) was only mitigated by a significant increase in employment. The period of declining real oil prices in the 1980s has resulted in reversals of these labour market shifts, which have led to a 17 per cent decline in agricultural wages in two years; i.e. in the rural labour market bearing the brunt of the adjustment. The analysis suggests that, through rising food prices and then through urban employment contraction and falling wages, the adverse impact of oil revenues on the poor has been substantial.