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MEDICINES AND SYMBOLS*

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THERE ARE DISAGREEMENTS about the status and efficacy of indigenous¹ African medicines. On the one hand, traditional healers are undoubtedly successful in helping people to overcome a variety of illnesses. On the other, people often assume that indigenous medicines are inferior to modern Western medicines.

I have recently discussed the logic of magic: I argued that, in magic, people confuse the logic of communication with the logic of material efficacy.² Some approaches to indigenous medicine provide a practical application of the argument.

Indigenous African medicine is a complex field, not susceptible to any single explanation, and the field is changing to meet the needs of modern Africa. This can be seen particularly in various attempts to give professional status to practitioners of indigenous medicine,³ which in turn involves some control over standards and ultimately over training. Frequently we find an emphasis on indigenous herbal medicines in both the teaching and research of professional associations. In 1969, Professor Akisanya, a biochemist, called for research into indigenous African medicines, to be tested according to modern scientific principles, in order to utilize indigenous knowledge in modern healing practice.⁴ This call has been repeated by other scholars in Africa.

To some extent at least, indigenous medicine adopts a cognitive model akin to that of modern science, and demands to be judged by standards comparable to those of modern science. If Foucault is right in arguing that empirical thinking in modern medicine is partly a result of the social and physical environment in which it is practised,⁵ indigenous African medicine will presumably adapt in a

* I acknowledge helpful comments on this paper from Pamela Reynolds and from participants in seminars in Manchester and Adelaide.

¹ I use the term 'indigenous' rather than the more common term 'traditional' in order to draw attention to the fact that we do not know what changes have taken place in the indigenous healing tradition in the recent past. When identifying healers working in the indigenous system, I refer to them as 'traditional healers'.

² M. F. C. Bourdillon, 'Magic, communication and efficacy', *Zambia* (1988), XV, 27-41. My argument is close to that of J. Skorupski, *Symbol and Theory* (Cambridge, Cambridge Univ. Press, 1976), esp. 125-59.

³ See M. Last and G. L. Chavunduka (eds.), *The Professionalisation of African Medicine* (Manchester, Manchester Univ. Press, 1986).

⁴ A. Akisanya, *New Wines in Old Bottles* (Lagos, Univ. of Lagos, inaugural lecture, 1969).

⁵ M. Foucault, *The Birth of the Clinic: An Archaeology of Medical Perception*, trans. A. M. Sheridan Smith (New York, Pantheon, 1973 [Originally published as *Naissance de la Clinique* (Paris, Presses universitaires de France, 1963)]).

parallel way. Is there any reason to propose a logical distinction between indigenous medical knowledge and that of modern doctors? To begin to answer this question, we need to take a closer look at indigenous healing practices. My focus will be on Zimbabwe, and the Shona peoples in particular, but the arguments have a wider application.

INDIGENOUS SHONA HEALING

Most traditional healers in Shona society claim to be guided in their art by a helping spirit who takes possession of the healer from time to time, when, according to Shona belief, it is the spirit who speaks through the body of the host. In keeping with this belief, it is rare for a traditional healer to admit to having been taught by another healer. Rather, traditional healers attribute their knowledge of indigenous medicines to the influence of their spirits, who reveal cures in dreams, or guide the healers in the veld to appropriate plants. Sometimes, the cures are revealed to the healer through the dreams of their patients (often themselves potential healers). Accounts of the histories of particular healers emphasize the power of the healing spirits imposing themselves on apparently reluctant hosts.

Practice does not, however, exactly correspond with the ideology that the power of healers comes simply from their spirits. A traditional healer usually comes from a family containing one or more established healers. The prospective healer is usually chosen by a senior relative, an established healer, who starts to teach the child about indigenous herbs from early childhood onwards. The child is likely to act as an assistant to the relative even, as the child moves into his or her teens, to the extent of treating patients in the absence of, though under the direction of, the healer. Such training requires the willing co-operation of the child.⁶

A knowledge of herbs has always been important in indigenous medicine. Practitioners build up their reputations and clienteles partly on the knowledge of a variety of herbs. Learning about herbs is an important part of the informal training of aspiring practitioners.

Professional associations which have been developing in recent times place an even greater emphasis on herbalism.⁷ The Zimbabwe National Traditional Healers Association (ZINATHA), the largest and the officially-recognized association in the country, established two schools at which students were taught the use of plants and other medicines (together with hygiene and simple book-keeping), and also co-ordinates research on plants. After completing the one-year course in medicines, students served a three-year apprenticeship in one of the

⁶ See P. Reynolds, 'The training of traditional healers in Mashonaland', in Last and Chavunduka (eds.), *The Professionalisation of African Medicine*, 165-87.

⁷ Chavunduka and Last, 'Conclusion: African medical professions today', *ibid.*, 262-5.

clinics run by the Association, but spirit mediumship (the dominant technique of traditional healers in Zimbabwe) was never taught.⁸ In other countries, too, we find traditional healers' associations paying more direct attention to research and training in herbalism than to other aspects of indigenous healing techniques.

Professor Chavunduka and Dr Last attribute this trend to a number of factors. Herbalists were less organized than healers in cults, and so had more to gain from the formation of associations. Herbalism fits in better with a move towards empiricism induced by the modern educational system. Herbalism is more easily subject to scientific investigation. There is the further point that herbalism is more tangible than other aspects of indigenous healing and, therefore, is more easily taught, examined and controlled. We have seen a similar trend in Western medicine, in which training takes place largely in terms of chemical or surgical intervention in teaching hospitals: such an environment minimizes attention to social and environmental factors in health, and does little to prepare general practitioners for much of their work, which comprises dealing with people's personal and social problems. The medical profession has been aware of problems in the training system for thirty years at least, but has been unable to overcome them: knowledge of chemistry and anatomy can be objectively taught and examined, but it is not so easy to teach and assess objectively a bedside manner and an ability to help with social problems. Perhaps traditional healers' associations were falling into the same trap of focusing on what is easiest to control. It is, perhaps, significant that the schools of ZINATHA ceased to function on account of financial problems and problems over the structure and the curricula of the training programme.

Whatever the situation in traditional associations, a knowledge of herbs has always been important in traditional medicine. The long training of aspiring practitioners in the use of herbs has resulted in a considerable body of indigenous knowledge about herbs and their uses. A study of herbal medicines used by 250 traditional healers from all over Zimbabwe revealed that more than 500 different species were in use, comprising about ten per cent of flowering plant and fern species in Zimbabwe, and about half of the species which have vernacular names.⁹ From standard published works, 234 of these medicinal plants are also used for medicinal purposes in other countries in Africa, though only 60 plants are used to treat the same kinds of complaints in different countries. The few that are used to treat the same complaints in different countries are used to treat other complaints as well.¹⁰

⁸ G. L. Chavunduka, 'ZINATHA: The organisation of traditional medicine in Zimbabwe', *ibid.*, 37-8. The schools and clinics had a short life, and were no longer functioning by the end of 1988.

⁹ M. Gelfand *et al.*, *The Traditional Medical Practitioner in Zimbabwe: His Principles of Practice and Pharmacopoeia* (Gweru, Mambo Press, 1985), 76.

¹⁰ *Ibid.*, 240.

Professor Chavunduka emphasizes the common usage of a number of plants, and concludes from the data that traditional healers have built up a significant body of medicinal knowledge which could supplement the drugs used by Western medicine, especially in view of the difficulty in obtaining the latter on account of the problems of hard currency that the country faces.¹¹ The task of comparing usage across countries is difficult, bearing in mind the variations in flora and, more particularly, the sparsity of information publicly available. The fact that there is common usage of a number of drugs does indeed support the view that the properties of at least some herbs are worth investigating from a scientific point of view.

The variety of uses of herbs, however, is more striking than the similarity of uses. Gelfand *et al.* found 168 plants which were prescribed for certain complaints in Zimbabwe, but which were prescribed for different complaints in other countries.¹² Even when plants are used for the same problems in different countries, they are used for other problems as well. To take one example, Gelfand *et al.* list *Swartzia madagascariensis* as being used in Zimbabwe, Zambia and Zaïre for treating diarrhoea and headaches: in Zimbabwe the root is commonly and widely used for treating diarrhoea, and the root and pod are commonly used for treating convulsions; on rare occasions the root is used for infertility in women and oedema; the pod is commonly used for syphilis and occasionally for wounds and headache; the fruit is commonly used as an emetic and as a fish poison, and occasionally for abdominal pains and cataract; the bark is occasionally used for earache.¹³ Many herbs are used to treat a wide variety of complaints even within Zimbabwe. The medicinal uses of a single substance varies widely, and this suggests that any concept of chemical treatment is peripheral to most of indigenous medical practice.

Even when the same drug is used for treating similar symptoms in different countries, this does not exclude a common perception of symbolic rather than chemical properties. To take the example of *S. madagascariensis* again, V. W. Turner states that among the Ndembu of Zambia the roots of this tree are used to treat stomach illness in children (fitting in with the common usage just mentioned), and gives the Ndembu healer's explanation: *Kapwipu* (*S. madagascariensis*) medicine is used because it is a hard tree. Hardness (*ku-kola*) represents health and strength.¹⁴ This explanation has little to do with the chemical properties of the root.

¹¹ G. L. Chavunduka, 'African Traditional Medicine and Modern Science' (Harare, Univ. of Zimbabwe, Symposium on Development of Drugs and Modern Medicines, 6 Aug. 1988, as reported at length in the *Sunday Mail*, 7 Aug. 1988).

¹² Gelfand *et al.*, *The Traditional Medical Practitioner in Zimbabwe*, 240.

¹³ *Ibid.*, 154-5, 286.

¹⁴ V. W. Turner, 'Lunda medicine', in his *Forest of Symbols: Aspects of Ndembu Ritual* (Ithaca, Cornell Univ. Press, 1967), 316.

Turner gives a list of medicines used in certain rites of affliction among the Ndembu.¹⁵ It includes roots and leaves from a strong, tough tree to impart virility and strength; a tree with a slippery surface, related to the way children have slipped away from the woman being treated, and the need to make diseases slip away; the bark and leaves of a tree, whose name derives from the word to reveal, and whose many small fruits make small animals appear to the hunter; roots and leaves from a tree with strong thorns to catch a child; and others. Some plants are used because their names associate them with the condition being treated or the desired effects of treatment. Other medicines fit in with the symbolism of hotness and coolness, and elsewhere Turner says that many medicines fit in with the tripartite Ndembu colour symbolism, chosen because they are, or they come from something that is, white or red or black.¹⁶ He lists indigenous explanations of herbs used, which often refer to their bitter or hot taste. Other medicines are used because the plants, or sometimes animals, in some way characterize the symptoms of the patient. All the senses, sight, hearing, taste, smell and touch, are employed in the analogies between the medicines used and the disease or the desired effects. Some plants and objects used medicinally also appear in cultic rituals. Turner explains the use of Ndembu medicines in terms of their symbolic significance, rather than because of any chemical property, although he does point out that since Ndembu healers try many medicines it is likely that some become established because they are observed to bring relief. As E. H. Ackerknecht has pointed out, the knowledge and use of some medicines that are physically efficacious does not make the system of medicine a scientific one.¹⁷ The knowledge of herbs, and of the symbolic system in which they are used, may be detailed and require much learning; but it does not necessarily involve a knowledge of drugs.

We are in the realm of what is often called sympathetic or homeopathic magic: the medicines have qualities which the healer would like to transfer to the patient. Although attempts to transfer qualities (such as heat or perhaps even disease) by contagion or consumption can in principle be quite empirical, the whole context of Ndembu medicine shows that the dominant associations are at the cognitive and symbolic level. As in much magic, it is a response to fear of what cannot be controlled empirically: people express their wishes and hopes with the cognitive associations they can control.¹⁸

Unfortunately, there is little published work on attempts to obtain and elucidate the symbolic reasons behind the use of indigenous medicines in

¹⁵ V. W. Turner, *The Ritual Process* (London, Routledge and Kegan Paul, 1969), 24-7.

¹⁶ Turner, 'Lunda medicine', 303-5.

¹⁷ E. H. Ackerknecht, *Medicine and Ethnology: Selected Essays*, ed. H. H. Walser and H. M. Koebing (Baltimore, Johns Hopkins Press, 1971), 135-61.

¹⁸ I have argued this more fully in 'Magic, communication and efficacy'.

Zimbabwe. The vast collection of herbal remedies by Gelfand *et al.* gives no details of texture, colour or smell of the plants used, neither does it give any indication of other symbolic usages of the plants. No attempt was made to obtain a symbolic exegesis of the use of herbs from the practitioners themselves. Indeed, there is some doubt about the usefulness of a collection such as this, in which herbs are taken out of the healing context, affecting both their symbolic value and their possible chemical value when used in conjunction with other herbs. Anyone who has seen the huge dominant baobab trees in the woodlands of the lower-altitude areas of Zimbabwe will readily see a sympathetic symbolism in the use of the bark of this tree 'to secure respect, prestige and security in one's job', or the bark and fruit 'to fatten babies'; the trees are also used for important land shrines in some areas. Nevertheless, as Turner points out, we should be wary of attributing a logic without reference to the explanations of people within the culture concerned.

We can notice again the point that many plants are used for a wide variety of complaints in different countries, and even by different healers in Shona country: this further suggests that treatment is determined largely by a variety of local, and even individualistic, systems of symbolic logic rather than by universal physical properties.

There is the further point that traditional healers often learn about medicines through dreams. One reason for dreaming about a herbal treatment may be a subconscious working on past training and experiences. The ability to call on past experiences in this way, and the reliance of healers on this skill, could in principle be developed in a tradition that is not able to rely on written textbooks. But besides a causative association that one may have come across, dreams call on a variety of associations and experiences. Psychoanalysis has shown us that what appears in dreams has a logic, usually through some kind of symbolic association. Medicines that come from dreams are more likely to be susceptible to the kind of symbolic analysis presented by Turner than the biochemical analysis suggested by Akisanya.

Turner points out that the use of medicines has to be understood in the context of the Ndembo cosmology of hidden powers which have to be exorcised or controlled. The medicines themselves have such powers, and it is the healer's task to rouse the powers within the medicines to perform their healing functions. This is clearly not the efficacy of chemical drugs.

Elsewhere, Turner points out that many healing rituals refer to conflict within the community. It is now generally accepted in modern Western medicine that psychological and social factors are significant both in the incidence of disease and in the healing process. Turner points to the skill of traditional healers in pinpointing areas of tension, and in organizing rituals to overcome tensions and restore some kind of order and harmony in the community.¹⁹

¹⁹ V. W. Turner, 'A Ndembo doctor in practice', in his *Forest of Symbols*, 359-93.

Bacteria and viruses may be immune to complex symbolic systems, but people are not. In so far as an important part of the traditional healer's role is to influence the attitudes of his clients, especially their attitudes towards one another, involving them in symbolic gestures and rituals may well be the most effective way to do this. At the individual level, a patient's attitude may affect the ability of his own body to fight the bacteria and viruses, which are consequently indirectly affected by the use of symbols.

INDIGENOUS AND WESTERN MEDICINE

A variety of recent studies have pointed to the limits of modern medicine on the one hand, and the very real efficacy of indigenous practices on the other.²⁰ Nevertheless, what we have seen so far suggests fundamental differences between the two systems. It will be useful to look at some typologies of the differences.

In the early part of this century, it was customary for administrators, missionaries and others to dismiss indigenous healing practice as superstition and the practitioners as charlatans. To such people, the difference between indigenous and modern medicine is the difference between superstition and science. At worst such views were simply ethnocentric. Although such views have rightly been dismissed in the anthropological tradition, two points need to be considered. Firstly, these ethnocentric perceptions were given some apparent credibility by the use of deception on the part of traditional practitioners. Secondly, traditional practitioners have occasionally harmed their patients by administering toxic substances.

To take the first point, a common example in Southern and Eastern Africa is when a healer produces a worm or other object which he claims to have been the cause of sickness, and to have sucked this object out of the body of the patient, usually into a horn or similar vessel placed against some part of the patient's body. That such practice involves deception is clear from Evans-Pritchard's account of a Zande healer's reluctant teaching of such tricks to the anthropologist's Zande assistant, and the assistant's dismay in discovering that the practice simply depended on sleight of hand.²¹

Lévi-Strauss produced an interesting account of how an indigenous healer (in this case in North America) might at first be disillusioned about the deceptive aspects of the healing art, but might nevertheless continue to practise in the genuine belief that he offered some relief to his patients which they could get from nowhere else, and that his practice was less fraudulent than that of other healers.²² It is no longer tenable to dismiss indigenous medicine as fraudulent. At best such a notion arises from a failure to see the necessary distinction in perceptions between the practitioner who

²⁰ See, for example, A. L. Strauss, *Where Medicine Fails* (New Brunswick, Transaction Books, 1979).

²¹ E. E. Evans-Pritchard, *Witchcraft, Oracles and Magic among the Azande* (Oxford, Clarendon Press, 1937), 229-39.

²² C. Lévi-Strauss, *Structural Anthropology*, trans. C. Jacobson and B. G. Schoepf (London, Penguin, 1968), 175-82.

manipulates symbols and the subject who is affected by the symbols: such distinctions can be used unethically as in much advertising or by a quack,²³ but the implied 'deception' can, and often is, used to benefit the subject (as in the use of a placebo).

A modern general practitioner who prescribes for material gain a drug that is not necessary would be considered as behaving unethically. But the same deed may be acceptable when the benefit of the patient is the motive. One doctor described to me how she prescribed a harmless but unnecessary drug to a patient who had problems at home which he clearly wished to discuss with her on a regular basis: it is socially acceptable to visit the doctor to have a prescription renewed, but not to discuss one's relations with one's spouse!

The point I am making is simply that the use of deception in certain situations by traditional healers to achieve their effects does not necessarily mean that these healers are charlatans.

On the administration of toxic substances, a number of cases of harmful results of the use of poisonous herbs by traditional healers have come before Western medical practitioners for remedy.²⁴ We could simply dismiss these incidents *post factum* as incompetence on the part of the individual practitioners involved: indeed, we have no comparative statistics on harm done by professional healers in either the modern or the older African tradition — and there are those sceptics like Ivan Illich who regard modern medicine as doing more harm than good in society.²⁵ The question of error and testing is more complicated than this; the point at this stage is that the existence of error does not itself condemn a system which has many beneficial results.

While the limits of modern medicine and the efficacy of traditional healing are widely accepted in academic circles, there remains a popular characterization of the two systems which associates the modern Western system with science and progress, while indigenous systems are associated with ignorance and backwardness. We notice that champions of indigenous medical knowledge, such as Chavunduka and Akisanya, want scholars in the modern scientific tradition to examine the herbs, to isolate the active ingredients and to verify the most effective form of dosage. It is true that Chavunduka wants scientists to do this mainly in order to restore confidence in indigenous medicines, which he assures us have been fully researched by indigenous healers and are effective. Nevertheless, the need to restore confidence suggests that many people have more confidence in the

²³ Malinowski was right to see something common in the logic of quackery and advertising on the one hand and the logic of Trobriand magic on the other: see B. Malinowski, *Coral Gardens and Their Magic* (London, Allen and Unwin, 1935), 237–8. But there is reason to believe that the traditional healer, unlike the advertiser and the quack, usually himself believes in what he is doing.

²⁴ See Gelfand *et al.*, *The Traditional Medical Practitioner in Zimbabwe*, 294–5.

²⁵ See I. Illich, *Limits to Medicine: Medical Nemesis: The Expropriation of Health* (Harmondsworth, Penguin, 1977).

ability of modern science to assess the chemical effectiveness of drugs than they have in traditional healers. Is this simply a result of cultural imperialism? Or is there some basis to common people's beliefs?

Turner suggests that indigenous medicine treats symptoms only, whereas Western medicine treats disease.²⁶ The idea is that a traditional medical practitioner might try to treat a headache or a fever, whereas Western medicine will aim to find out what in the body of the person is causing the headache or the fever and treat that. On the other hand, one could equally argue that Western medicine stops with the physical body, whereas indigenous medicine aims to discover and to treat whatever in the social environment makes the individual liable to succumb to disease. D. I. Ben-Tovim, in a study in Botswana, cites a psychiatric patient as saying, 'The Tswana doctor tells me why I am ill. Your medicine cures the illness as it affects the body.' Ben-Tovim interprets this as a view that Western medicine suppresses the symptoms of disease, but indigenous medicine offers answers to 'why' in terms of indigenous beliefs.²⁷

There is a problem over what counts as symptom and what counts as disease. Frequently the term 'disease' is used to apply precisely to a disorder as defined physiologically by Western medicine. If such a definition is accepted, it is neither surprising nor informative to state that Western medicine treats disease, and other systems treat something else.

Botswana has been relatively successful at organizing a primary health care system in which traditional healers have a role to play. They are involved in the local-level health committees, and even Western doctors are appreciative of the contributions that traditional practitioners can and do make at this level. But there is frequently a breakdown in communication when particular diseases are discussed. Traditional healers may frequently adopt the name of a disease from Western medicine, say, 'bilharzia' or 'AIDS', but the perception and definition of the problem that they call by that name has little to do with the cognitive system of Western medicine. Conversely, some complaints treated by traditional healers have no clear English translation.²⁸

Even when traditional healers talk about diseases in terms of observable physical symptoms, and claim to treat them accordingly, we find that, in practice, diseases are defined and treatment is applied according to other factors. It has long been established that diviners using dice use the throws freely as a peg on which to hang their commentaries on the social situation which they are considering.²⁹

²⁶ See Turner, 'Lunda medicine', 305.

²⁷ D. I. Ben-Tovim, *Development Psychiatry: Mental Health and Primary Health Care in Botswana* (London, Tavistock, 1987), 179.

²⁸ See Gelfand *et al.*, *The Traditional Medical Practitioner in Zimbabwe*, 77.

²⁹ See R. Werbner, 'The superabundance of understanding: Kalanga rhetoric and domestic divination', *American Anthropologist* (1973), LXXV, 1414-40, and M. F. C. Bourdillon, *The Shona Peoples* (Gweru, Mambo Press, 3rd edn., 1987), 154-6.

Similarly, healers freely interpret symptoms in the light of social problems and conflicts, irrespective of how particular symptoms are paradigmatically associated with specific problems: people may say that backache is typically a symptom of witchcraft, but, depending on circumstances, a particular case may be regarded as a sign from the ancestors or simply the advent of old age.

Traditional healers normally look at a problem in its total social and psychological context: the 'disease' as defined by Western medicine is simply the symptom of the problem. The detailed knowledge of anatomy and physiology which provides the parameters of a Western definition is, where it exists at all, peripheral to the indigenous cognitive system.

The problem is perceived, defined and treated differently in each system. The distinction in Western medicine between disease and symptom is applicable only to the Western system and is meaningless in the context of the indigenous system.

A third way in which I have heard the difference between the two systems characterized is that indigenous African medicine (at least in the region under consideration) has no coherent theory of the body. Again, this notion has superficial plausibility when one compares the detailed anatomical knowledge on which modern medicine is based with the very limited knowledge of anatomy of traditional healers. But again there are problems when one examines the notion more closely, problems that relate to the whole debate about modes of thought.

One problem arises over what might constitute theory in a non-literate tradition. Although many, if not most, traditional healers are now literate, their knowledge and training have been acquired in a tradition that has until recently had no writing, and which still does not rely on writing. Indeed, a fairly common feature in accounts of young persons being chosen by a healing spirit is mental disturbance involving neglect of school work, or even running away from school.³⁰ One does not expect to find in such a non-literate tradition a systematic enquiry and exposition of the logical basis for practical decisions. This does not negate the possibility of a logical basis which does in fact systematize practical decisions. Can one talk meaningfully about implicit theory?

Some non-Western medical traditions do have their own theories of the body, Islamic medicine, for example, or many of the Eastern traditions. Such theories are built up in written literature, even if many or even most of the healers are in fact illiterate. But it is not clear that the existence of such theory is useful in differentiating indigenous and modern medicine in Southern Africa.

Take, for example, Kapferer's recent outline of 'exorcist theory' in Sri Lanka

³⁰ It is clear from the role of spirit mediums in the liberation war in Zimbabwe leading up to independence in 1980 that spirit mediumship was an effective symbol of opposition to White culture; see M. F. C. Bourdillon, 'Religious symbols and political change', *Zimbabwe* (1984-5), XII, 39-54, and D. Lan, *Guns and Rain: Guerrillas and Spirit Mediums in Zimbabwe* (Harare, Zimbabwe Publishing House, 1985).

in terms of three fundamental humours: wind, blood/bile, and phlegm.³¹ These should be in balance in a healthy person. Diseases, emotional states and afflicting demons are understood in terms of how they affect this balance, and treatment proceeds accordingly. Here we find an established theory of the body, on which treatment is based. Nevertheless, there is an overlap in the symptoms attributed to the different humours, and in the effects of various spirits. The understanding and treatment of illnesses within such a system seems closer to the understanding of affliction in terms of spiritual powers that we find in traditional Shona medicine than it is to modern medicine. It is the specific biochemical theory of the body, which was only recently developed, rather than the existence of theory as such, which distinguishes modern medicine from other traditions. It could be argued that such biochemical theory provides, in any case, only a limited understanding of disease.

Turner emphasizes the importance of spiritual powers and witchcraft as believed causes of disease in contrasting the Ndembu healing system with that of Western medicine. He argues that the Ndembu do not know of natural causes for serious diseases and resort to divination rather than diagnosis.³² This is probably overstated; but the valid point remains that when a disease is serious enough to threaten life, or persists beyond normal expectations, it demands some kind of supernatural explanation.³³ The aim of healers is to make the invisible appear, and then to tame it, through the use of symbols.³⁴ The polysemic symbols used in turn relate to the fundamental values and ethics of Ndembu society, which are brought into play into such everyday matters as curing a headache.³⁵

Turner is somewhat dismissive of the efficacy of indigenous medicines, though he does concede that they might help in mild psychosomatic illnesses. He attributes the continued resort to indigenous medicine to its intimate linking with the whole Ndembu cognitive system: to question the efficacy of indigenous healing would be to question the whole Ndembu world view. He also points to the fact that most ailments are self-curing, and may appear to be cured by indigenous treatment (or, we might add, equally by modern treatment). He argues that there is a danger of assuming that the Ndembu are able to cope with a poor health situation through their indigenous medicine, whereas improved diet and better hygiene, together with more modern preventive medicine and more widespread hospital facilities, are urgently required.

³¹ B. Kapferer, *A Celebration of Demons* (Bloomington, Indiana Univ. Press, 1983), 49-52.

³² Turner, 'A Ndembu doctor in practice', 360.

³³ See Chavunduka's category of 'abnormal illness' among the Shona, requiring explanation and treatment in terms of spirits or witchcraft, G. L. Chavunduka, *Traditional Healers and the Shona Patient* (Gweru, Mambo Press, 1978), 12.

³⁴ Turner, 'Lunda medicine', 353.

³⁵ *Ibid.*, 356.

Now, more than twenty years after Turner wrote, we are inclined to be less confident about modern medicine and less dismissive of indigenous practices. Nevertheless, Turner was probably right in his assessment that improved diet and hygiene comprise important health needs for the Ndembu, although mental problems due to dislocation and other problems of contemporary life possibly require equal help from the traditional system. Turner was also right in pointing to a basic logic of Ndembu medicine which is radically different from that of modern medicine. Modern medicine is concerned with the inanimate world of nature. Ndembu medicine is concerned with personal relations and personal causes of illness, both of which can be manipulated through the use of symbols. Where indigenous medicine does provide physical treatment of disease, this is secondary to the main thrust and logic of the healer's practice.

To say that chemical treatment is secondary is not to deny that it is real. Work by Professor Chavunduka and Dr P. Reynolds suggests that physical properties of drugs used by traditional healers in Shona society are widely known and utilized in indigenous healing. Moreover, a number of herbs are invariably mixed in any medicine. Some healers explicitly test new medicines, often on themselves, before administering them to their patients.

Nevertheless, the testing in the traditional system is not as public and well developed as it is in the Western system, with its systematic use of controls and complicated statistical tests. It is true that sometimes new drugs are put on to the market without adequate testing, but such incidents are in breach of the norms that have been established. In contrast, when a traditional healer dreams up a new medicine, any testing of this will be simply on his own initiative. The amount of testing a healer can do on himself is very limited.

If we are to look at the logic of a system of knowledge, it is important to look at the generation and incorporation of new ideas. Old ideas are generally accepted on authority and learnt in any system: most human knowledge is in fact habitual.³⁶ The scientific tradition has developed techniques, which may not always be properly applied, for testing new ideas and expanding the body of available knowledge: the way in which new ideas are incorporated into indigenous medical knowledge needs to be examined. Here there is a problem in that there have been no studies over time to provide data on the incorporation of new ideas into the traditional indigenous healing system, although there has been some recent work on the use of Western medicine by traditional indigenous healers.³⁷ Nevertheless, the contrasting emphasis on revelations by spirits in

³⁶ My argument is more fully expressed in 'Magic, communication and efficacy'. I do not agree with the characterization of traditional medicine as only habitual, by Ackerknecht, *Medicine and Ethnology*, 156.

³⁷ See C. Peltzer, *Some Contributions of Traditional Healing towards Psychosocial Health in Malawi* (Frankfurt, Verlag für Psychologie, 1987).

dreams on the one side, and on observation and systematic testing on the other, suggests two different cognitive systems.

This is not to suggest that the traditional system is inferior because it is not scientific. There are differences between the two systems, but any correct characterization of these differences must allow for the advantages and shortcomings of each.

TWO TYPES OF EFFICACY

In the healing process, there are two distinct types of efficacy.³⁸ One is the inanimate physical efficacy of chemical or surgical treatment. Secondly, there is the efficacy of communication, communication to patients and their associates of appropriate attitudes for the healing process to take place.

Communication of factual knowledge (what Sperber calls encyclopaedic knowledge³⁹) is often obscured by the polysemic nature of elaborate symbols, which rarely have a very precise meaning. But the communication of attitudes is enhanced by the use of symbols which often derive their power from repeated use in a variety of contexts, and which have an effect on the psychology of individuals.

This second type of efficacy is used in modern medicine in the use of placebos. A combination of the two types is frequently used in modern psychiatric treatment, and in some other traditions communicative treatment is reinforced by the use of psychoactive drugs.⁴⁰ But generally in the modern system, medical practitioners are aware of which type of efficacy they are trying to manipulate. The testing of drugs and treatments has controls, precisely to enable scientists to distinguish between the two types of effects. And it is clear that, apart from in psychiatry, it is the physical efficacy of various treatments that is emphasized in modern medicine.

In the indigenous system, some medicines are administered because of their known physical properties. Others are chosen because of some symbolic association, and their use based on the logic of communication rather than that of physical causality. The emphasis on dreams and revelations in indigenous medicine, together with the ways in which herbs are used, suggests that this tradition pays more attention to symbolic efficacy. Such symbolic usage may comprise a realistic attempt to control the disposition of the healer's clients; or in some cases it may comprise 'magic', trying to control the material world through symbolic associations.

³⁸ The two types of efficacy correspond roughly to the two types of medicine discussed by H. Ngunane, *Body and Mind in Zulu Medicine* (London, Tavistock, 1977), 109. My suggestion is that particular medicines may involve one or other type of efficacy, or both, in different circumstances.

³⁹ D. Sperber, *Rethinking Symbolism* (Cambridge, Cambridge Univ. Press, 1974).

⁴⁰ See D. H. Efron, B. Holmstedt and N. S. Kline (eds.), *Ethnopharmacologic Search for Psychoactive Drugs* (Washington DC, US Govt. Printing Office, Public Health Service Publication 1645, 1967).

Failure to differentiate between the logic of communication and the logic of physical efficacy is a cognitive error, resulting in what can conveniently be called magic. The use of symbolic medicines as if they were physical drugs is magic. Turner argues that in Ndembu medicine no attempt is made to distinguish between the different types of effects that medicines may have, and that symbolic medicines are mixed indiscriminately with herbal drugs. Against this one might argue that, although no explicit distinction is made between the two types of efficacy, indigenous healers use both types of logic effectively; consequently, there is no reason to assume that traditional healers are unable to make the distinction, even though the distinction does not appear explicitly in their body of knowledge. Elsewhere, traditional healers are explicitly aware of the two types of medication, although they deliberately confuse the two as far as their patients are concerned,⁴¹ since their status depends on a certain mystification of their techniques. The fact, however, that the distinction is not explicit in traditional expositions of their practice means that errors are likely to occur from time to time.

Perhaps the greater confusion is in the minds of academics rather than in those of the healers. Perhaps biochemists interested in possible chemically-active ingredients of traditional medicines need to learn something of anthropology in order to see in what circumstances and combinations the medicines are supposed to work. Indeed, the precise combinations of herbs may be important for an understanding of their chemical efficacy.

As I mentioned at the beginning of this article, Foucault has argued that the perspective of modern medicine has evolved in response to the situations in which it is practised. The role of medics as advisers and counsellors increased with the decline of the standing of priests. An emphasis on environmental factors in health, together with state control of large city hospitals, turned the attention of medicine to diseases rather than to patients, and to what can be seen and examined. Patients began to be taken out of their home environment, and to be treated as cases in hospitals. At the same time the state began to take a greater interest in the training and practice of medicine. The emphasis in medicine consequently turned away from invisible forces to the details of what can be seen.⁴²

If his insight is correct, we should expect to see indigenous African medicine moving in a parallel direction as the society in which it is practised changes. People move from rural communities, in which everyone knows everyone and healers can be chosen according to personal reputations, into large urban populations, in which relationships, including those with healers, are simple and functional rather than complex and personal. Accordingly, the impersonal state takes control over many institutions, including those surrounding health.

⁴¹ Personal communication from T. Allen, from his recent field research in Ethiopia.

⁴² Foucault, *The Birth of the Clinic*.

Indigenous healers find that they are having to treat patients without having detailed knowledge of their social backgrounds. The numbers of patients are such that healing becomes a full-time occupation, and 'clinics' are set up for the more efficient processing of patients. The confidence of the public is furthered by membership of formal organizations, and perhaps by formal training. The power of the healers must now depend more on the power of their medicines.

Does this turn indigenous medicine into becoming a primitive and inferior form of modern medicine? One could argue this case, claiming that it remains in common use largely because it is more accessible in terms of cost, both in training (allowing for a greater number of practitioners charging little for their services) and in the materials it uses. On the other hand social institutions do not change suddenly and absolutely. There is still much demand for the traditional role of the indigenous healers in the rural areas. The resurgence of alternative medicines in Western countries shows that Western medicine is unlikely ever to fulfil all people's health needs even in industrialized urban areas.

CONCLUSION

I have wandered away from my original subject. Where does all this leave the status of the indigenous medicines used by traditional practitioners? Let me summarize my conclusions.

There are two kinds of logic involved in healing practice. There is the logic of communication, affecting people's attitudes through symbolic associations; and there is the logic of physical cause and effect. Both forms are utilized in both modern and indigenous medicine, though with very differing emphases.

The explicit use of subconscious associations through dreaming, and the total immersion of indigenous medicine in indigenous culture, give traditional practitioners skills in manipulating social and psychological states with which modern practitioners in Africa are unable to compete.

Some indigenous African medicines may well have chemically-effective ingredients which are worth researching. Useful drugs in the past have been obtained from similar traditions. Nevertheless, academics involved in such research should be aware that many medicines are symbolic rather than physical in their efficacy. Academics who assume that all herbs, or even the majority of herbs, are to be treated as equivalent to Western drugs are making the error of magic.

Although indigenous knowledge includes chemical drugs, the way in which the body of indigenous knowledge is built up, and the way in which new ideas are initially assessed, is more appropriate to symbolic medicines than to chemical drugs. In the field of chemical drugs, the modern scientific tradition is clearly superior, with its more developed theories of the chemistry of the body, and its

more explicit testing techniques (even if they are not always used by the pharmaceutical industry). In this field, indigenous knowledge is rightly subordinated to Western medicine.

The question arises as to the possibility of the professionalization of indigenous practice, at least according to the modern model. It seems likely that this can be fully achieved only at the cost of reducing the emphasis on communication and the social side of healing. The most effective part of indigenous healing is hard to teach and examine and control.

A PARTICIPATORY MODEL OF AGRICULTURAL RESEARCH AND EXTENSION: THE CASE OF VLEIS, TREES AND GRAZING SCHEMES IN THE DRY SOUTH OF ZIMBABWE

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WHY HAVE PEASANT farmers in Africa not adopted modern agricultural technology more readily? In the past the most common diagnosis was peasant ignorance or cultural conservatism. The answer then 'obviously' lay in programmes of education and extension — hence the major investments in improving extension services in the 1950s and 1960s. The oft-repeated exhortation to 'educate the farmers' can still be heard today in some quarters.

In the 1970s and 1980s a new trend of thought emerged amongst agricultural economists and development planners which proclaimed the rationality of decision-making in rural farm-households. Obstacles to improved production were seen to be mainly external constraints on decision-makers — constraints such as restricted access to resources and the need of such farm-households to minimize risk. Thus improved understanding of the nature of these constraints by agricultural research scientists and extension agents became important, so that more appropriate technologies and more adaptable extension recommendations would be passed on to the farmers. Other suggested interventions were: better prices for agricultural produce, upgraded transport and other infrastructures, the wider provision of credit, improved inputs, supply and marketing systems, and so on.

THE NEED FOR A NEW MODEL OF AGRICULTURAL RESEARCH AND EXTENSION

The results of these kinds of diagnoses and prescriptions have, however, generally been disappointing. Significant improvements in 'practice-adoption' and increases in production have generally been achieved by only a minority of resource-rich farmers. The bulk of the rural population of Africa is made up of resource-poor farmers, defined as those 'whose resources of land, water, labour and capital do not currently permit a decent and secure family livelihood' (Chambers and Ghildyal, 1985, 3), and here success has been much more elusive.

As a result, attention is being shifted to the deficiencies of the technology itself and, even more importantly, to the process by which the technology is generated. In the older models the roles of research scientist, extension agent and farmer were well defined and seen as unproblematic: researchers generated the technology, extension officers communicated it, and farmers adopted (or failed to adopt) the solutions to their problems.

In some versions of this model, such as the Training and Visit system of extension, the problems that farmers faced were communicated to research scientists by field extension staff, who also assisted in the adaptation of standard recommendations (e.g. for fertilizer application) to suit particular conditions. Farmers, however, remained essentially passive recipients of the 'medicine' prescribed for them by development experts. It is these roles that are now increasingly being brought into question, and the active participation of farmers in the whole process of technology generation is at the heart of the search for a new paradigm for agricultural research and extension.

The Transfer-of-Technology Model

One of the most influential voices in this debate is that of Chambers. Chambers and his co-authors have typified the dominant paradigm, as described briefly above, as the Transfer-of-Technology model. In their analysis the main reason why this model has not been effective with regard to resource-poor farmers is because 'technologies . . . bear the imprint of the conditions in which they are generated. They are then adoptable in similar conditions, but often not adoptable where conditions differ' (Chambers and Ghildyal, 1985, 6). Because conditions on research stations, where most agricultural research has been carried out in the past, are often similar to those on resource-rich farms, and usually very different from those on resource-poor farms, it is hardly surprising that the technology generated through this process does not meet the latter's needs. The contrasts in conditions which give rise to this phenomenon are summarized in Table I.

In the Zimbabwean context the model fits reality most closely if we equate resource-rich farmers with large-scale commercial farmers, and indeed this would have been entirely apposite before Independence. But even within the major reorientation towards communal area farmers by research and extension that has taken place since 1980 the same kinds of contrasts may be found. If we see 'resource-rich' as a relative term, then the bulk of current agricultural research programmes are still servicing farmers in the high-potential regions of the country and, within these regions, those farmers who are either users of purchased inputs or cash-crop growers.

An Alternative Model: Farmer-First-and-Last

Chambers and his colleagues have suggested an alternative model of agricultural research which entails fundamental reversals of learning and location. In their

Table 1

TYPICAL CONTRASTS IN PHYSICAL, SOCIAL AND ECONOMIC CONDITIONS*

	<i>Research stations</i>	<i>Resource-rich farm</i>	<i>Resource-poor farm</i>
<i>Physical conditions</i>			
Soil	Deep, fertile	Deep, fertile	Shallow, infertile
Topography	Flat or terraced	Flat or terraced	Often undulating, sloping
Nutrient deficiency	Rare	Occasional	Common
Plot size and nature	Large, square	Large	Small, irregular
Hazards	Nil or few	Few, usually controllable	Common: floods, droughts etc.
Size of management unit	Large, contiguous	Large or medium, contiguous	Small, often fragmented
<i>Social and economic conditions</i>			
Access to inputs	Unlimited, reliable	High, reliable	Low, unreliable
Access to credit	Unlimited	Good access	Poor access
Prices	Irrelevant	Lower than resource-poor farmers for inputs, higher than resource-poor farmers for outputs	Higher than resource-rich farmers for inputs, lower than resource-rich farmers for outputs
Priority for food production	Neutral	Low	High

*Not all factors apply all the time, but most apply most of the time.

Source: Adapted from Chambers and Ghildyal, 1985, and Chambers and Jiggins, 1986.

Farmer-First-and-Last model one starts with the perceptions and priorities of families of resource-poor farmers rather than those of scientists. Research and learning are located on the resource-poor farm rather than on the research station and in the laboratory. Problems in need of research are identified by reference to the needs and opportunities of the farmer, and the research station has a referral and consultancy role serving the resource-poor family. Success is judged not by the rigour of research or by yields in resource-rich conditions, but by the spread of technology among the resource poor. These reversals are summarized in Table II. Thus the three major components of the Farmer-First-and-Last model are:

- (i) a distinctive diagnostic procedure, learning from farmers;
- (ii) generating technology on the farm and with the farmers; and
- (iii) evaluation of technology by adoption or non-adoption.

Is this not the same as the now widespread practice of Farming Systems Research? It is clear that in a number of ways Farming Systems Research has departed from a conventional Transfer-of-Technology approach. It seeks to understand the complexity of farm-household systems, including the needs and objectives of farmers and their families, and does so by means of multi-disciplinary teams which encompass biological, social and economic dimensions. In the diagnosis phase Farming Systems Research involves consultation with farmers on their problems. Relatively homogeneous groups of farmers who are likely to encounter similar problems and opportunities are identified as 'recommendation domains'. On-farm trials are often farmer-managed, and farmers assist in the evaluation of research results.

But does this go far enough? Chambers and Jiggins (1986) consider Farming Systems Research an adaptation of the Transfer-of-Technology model rather than as a fundamental break with it. They claim that in Farming Systems Research the power of choice remains primarily with the scientists, who make the important decisions about what to try and what to do. The linear sequence of classical Transfer-of-Technology has been modified by building in feedback loops and cycles of referral and evaluation; but, 'in the absence of farmers' determination of research agendas, the process remains Transfer-of-Technology, with the scientist first and the farmer last' (Chambers and Jiggins, 1986, 19).

These views have been criticized recently by Farrington and Martin (1987), who see a need for participatory approaches which complement Farming Systems Research rather than attempt to replace it. In their view Chambers and Jiggins's misgivings relate more to the application of Farming Systems Research than to the basic concepts involved, and the extreme farmer-centric stance of Farmer-First-and-Last is unjustified: scientists and the scientific method do have an important role to play. The critical component is the partnership between researchers and farmers.

Table II

CONTRASTS IN LEARNING AND LOCATION

	<i>Transfer-of-Technology</i>	<i>Farmer-First-and-Last</i>
Research priorities determined by . . .	Needs, problems, perceptions and environment of scientists	Needs, problems, etc., of farmers
Crucial learning is that of . . .	Farmers from scientists	Scientists from farmers
Role of farmer:	Beneficiary	Client and professional colleague
Role of scientist:	Generator of technology	Consultant and collaborator
Location of research and development:	Research station, laboratory, glasshouse	Farmers' fields and conditions
Features of research and development determined by . . .	Scientists' needs and preferences Research station resources	Farmers' needs and preferences Farm-level resources
Non-adoption explained by . . .	Failure of farmer to learn Farm-level constraints	Failure of scientist to learn Research station constraints
Evaluation by . . .	Publications, scientists' peers	Adoption, farmers

Source: Adapted from Chambers and Ghildyal, 1985.

AGRICULTURAL RESEARCH AND FARMERS IN THE SEMI-ARID AREAS OF ZIMBABWE

In Zimbabwe two-thirds of the communal area population live in Natural Regions IV and V, both of which are characterized by low and erratic rainfall. They are recommended for extensive and semi-extensive livestock production, although drought-resistant cash crops can be grown in favourable localities. Yet communal area farmers do not own enough cattle or indeed have sufficient land to engage in commercial ranching, and hence all grow food crops for subsistence and occasional sale as well as cash crops such as cotton and sunflowers. The hazards of crop production in these semi-arid areas are emphasized when one considers the probability of a 'normal' season (one in which rainfall is adequate to sustain plant growth without adverse dry spells) occurring in these regions is of the order of 40 per cent in Natural Region V and 35 per cent in Natural Region IV (Hussein, 1987).

Since Zimbabwe attained Independence in 1980 communal area farmers, with the help of increased levels of credit and improved supplies of inputs, have begun to purchase significantly larger amounts of fertilizers and chemicals, and marketed surpluses from this sub-sector have risen dramatically. Zimbabwe has been hailed as a rare success story in respect of peasant production for the market.

However, these increases in production and sales have not occurred 'across the board' but rather reflect an increasing differentiation of the communal area population which is based both on agro-ecological differences and on inequalities in the means of production. Thus in 1983/4, 63.1 per cent of the maize marketed by communal area farmers came from Natural Regions I and II where only 15 per cent of the communal area population lives (Moyo, 1986, 189). A survey conducted in 1984 found that rural households in the drier regions are much more likely than those in the higher rainfall zones to experience food scarcity in most years, and that the great majority of households in Regions IV and V received drought-relief food in 1983 (see Table III).

Class-based differentiation is indicated by the marked differences between rural farm-households in all communal areas in respect of land holdings, livestock, availability of draught power, access to off-farm income and access to credit. It is suggested by many researchers currently investigating this issue that the increases in marketed surplus are benefiting only a minority of better-off families (Moyo, 1986; Jackson *et al.*, 1987; Adams, 1987; Weiner, 1988).

How has agricultural research and extension attempted to meet the needs of the majority of communal area farmers who live mostly in the dry south and west of Zimbabwe? For many years, of course, this was not even recognized as a problem, let alone seriously addressed. From the point of view of large-scale commercial farmers these regions have no dryland cropping potential, and hence

the attention of researchers was focused mostly on beef ranching or irrigated crops such as sugar cane. Since Independence this attitude has begun to change, and the Farming Systems Research Unit within the Department of Research and Specialist Services in particular has attempted to test potential technological interventions aimed at overcoming or alleviating the powerful constraints on mixed crop-livestock farming in the semi-arid areas.

Table III

FOOD SCARCITY AND DROUGHT VULNERABILITY BY NATURAL REGION

<i>Natural Region</i>	<i>'Food is scarce in most years' (Percentage of households)</i>	<i>Received drought relief food in 1983</i>
II	13,9	1,0
III	16,0	41,3
IV	20,4	67,4
V	57,1	87,5

Thus trials involving the traditional drought-resistant small grains (sorghum and the millets) have been initiated on both research station and on-farm sites (Farming Systems Research Unit, 1985). The Lowveld Research Station in Chiredzi has been working on techniques of water conservation and concentration, appropriate fertilizer regimes, relay cropping, variety selection and sowing dates (Jones, Nyamudza and Nyati, 1987). Attention has also been turned to research aimed at improving the productivity of communal area livestock, which have been almost completely ignored and hence almost nothing is known about them (Mombeshora, 1985).

However, few reliable recommendations have yet resulted from this research programme and it may be many years before they do. Some of the results of the Communal Area Research Trials programme have thrown researchers into confusion, with a senior scientist revealing in 1986 that there was now a need to reduce the total number of trials in order to make the programme more manageable, and also to concentrate on understanding basic soil-plant-climate interactions in the sandy soils which predominate in the Communal Lands.*

*E. Whingwiri, remarks at an Agritex Senior Officers Conference held at the University of Zimbabwe, January 1986.

In the meantime, extension field staff in the semi-arid areas have continued to promote 'packages' of improved farming practices which include hybrid seed, fertilizers, pesticides and knapsack sprayers. Indeed, in the absence of any more appropriate knowledge, what else could they be expected to do?

Research in Chirumanzu (which is in Natural Region III) has shown that the few farmers who do make a profit on crops such as maize do so by applying much less than the recommended amounts of fertilizer (Drinkwater, 1987, 21). A recent analysis of the economics of fertilizer-use on maize in Natural Regions III and IV suggests that the most economic level of application is around half of that contained in the present Agricultural Finance Corporation package on offer, and around a quarter to a half of the recommendations based on soil analysis (Whingwiri *et al.*, 1987).

A few extension officials do listen to farmers and attempt to modify standard recommendations on the basis of local experience. Dialogue at the extension agent-farmer interface has even led to innovations being developed, as in Maranda, where farmers are advised to plough twice in every second or third furrow to achieve the same effect as a ripper tine. These are the exceptions, for on the whole extension practice still reflects a 'top-down, message-oriented approach', even though many Agritex staff recognize that 'the research that has backed them until now looks neither at the generation of sustainable yield levels nor the viability of communal area production' (Drinkwater, 1987, 2). The dominant mode of agricultural research and extension is still Transfer-of-Technology, and the result is a dearth of appropriate technical recommendations for peasant farmers in the semi-arid areas of Zimbabwe.

EXPERIENCES OF FARMER PARTICIPATORY RESEARCH AND EXTENSION IN ZVISHAVANE DISTRICT

Participation is the central theme of two projects being developed in Mazvihwa Communal Land in Zvishavane District, which is located in Natural Regions IV and V. Both projects have resulted from local demands generated as a consequence of research work being carried out in the area. The Oxfam-supported community water resources project is investigating the potential of vlei utilization, and the ENDA-Zimbabwe trees project is concerned with the development of community forestry initiatives. Both projects tackle individual farm potentials (arable production on vleis; agroforestry in fields and around homes), as well as communal resource issues (vleis in grazing land; indigenous woodland development). Both involve the close interaction of research and extension activities. Neither aspect is currently addressed by government policy on dryland agriculture or forestry. It is the general contention of this article that this policy gap on crucial issues (at least as perceived by farmers) can be attributed

in part to the lack of appropriate research and extension techniques that can effectively address these types of problems.

The Vlei Project

Close contact with farmers and a continuing dialogue resulting from research being carried out in Mazvihwa has highlighted vlei areas as being 'key resources' crucial to the sustainability of the dryland agropastoral system (Wilson, 1986; Scoones, 1987). However, very little is known about vlei systems, especially in the drylands. A more detailed appraisal of their functioning and potential for sustainable use is called for.

The aims of this focused appraisal have been

- (i) the characterization of dryland vlei systems in terms of their potential for use and constraints to sustainable development;
- (ii) the investigation of local innovations for testing; and
- (iii) the identification of key issues for policy, further research, institutional development and extension.

The appraisal techniques used have been simple and rapid, aimed at encouraging a close alliance between farmer, extension worker and researcher at all stages.

Initial characterization: Historical surveys

Historical precedents are often central to highlighting development constraints and potentials. Recollections of past experience can point to local sources of knowledge of earlier technologies or management practices and institutions that may assist current development attempts. Historical surveys can also show up the shortcomings of previous policies and help to avoid the simple resurrection of former (failed) approaches. The value of a historical survey has been particularly significant in the vlei project, since nineteenth- and early twentieth-century production in the dryland hilly areas of Zimbabwe is thought to have been largely reliant on vlei land (Wilson, 1986). As a consequence a number of production techniques (e.g. ridging, intercropping) were developed and are still remembered. Historical surveys are best carried out on the basis of a selection of key informant interviews to derive a locally specific view of major changes and recollections of particular practices. Older, long-term residents, both men and women, are obviously the best source of such information.

Classification and typologies

Initial investigations require a preliminary categorization of system types. This is the initial phase of defining relevant 'recommendation domains'. These need to be flexible and iteratively redefined. In the vlei research project a number of different vlei types, differentiated according to environmental characteristics, have been recognized:

- (i) Wet vleis: central marshy area; waterlogged in wet years; highly concentrated drainage; multiple catchments; sandy soils surrounding vlei.

- (ii) Dry vleis: shallow sloping catchments; no year-round surface water; vegetation distinct from wet vleis; sandy soils surrounding vlei.
- (iii) Red soil vleis: heavy red soil catchments; rarely waterlogged; variable catchment types.
- (iv) Eroded vleis: gully erosion often stopped; normally in grazing areas.

These vlei types can be located either in grazing areas or in arable blocks. In arable area vleis there is usually a seasonal grazing component of unfarmed portions. A working typology, that needs constant revision, can be derived only from a number of visits to different areas; it is developed through direct observation and discussion with farmers. Farmers often have useful local classifications with associated terminologies that can form the basis of further elaboration.

Agro-ecosystem functioning

A focused appraisal of system functioning requires the investigation of a number of interrelated aspects which can be subsequently analysed. The context we have found most useful for this appraisal is a group workshop. The workshop is facilitated by the extension worker and researcher together, who encourage the open discussion of selected issues. In the vlei research project these have been vlei production and use, environmental determinants, intervention potential and institutional issues.

Vlei production and use: The parameters of economic sustainability: Discussion of production and use is aimed at assessing the constraints and potentials of the existing production system. An attempt is made to get a picture of the range of practices rather than a description of the ideal. A useful technique for qualitative and rapid description is the construction of a flow diagram of production activities. This can incorporate both agricultural and economic factors in the same framework and can be constructed while in the process of discussion with farmers. A flow diagram can be a useful tool in identifying problems and opportunities that may involve interactions of agronomic issues, management practices and economic factors.

Seasonality has a great impact in dryland agro-ecosystems and an appropriate way of looking at this is through the construction of a seasonal calendar. Again interactions and trade-offs (e.g. between arable and livestock use) are highlighted.

Environmental determinants and ecological sustainability: A full understanding of the production system requires an investigation of the environmental factors that underlie it. In vlei workshops we discuss in detail soil structures, hydrological patterns, vegetation ecology and the problems of environmental degradation. This is based on farmers' often very detailed local observations and impression of causality.

Institutional issues: Issues of conflict, for instance between grazing and arable use of the land or between technical development and local beliefs surrounding the sacredness of wetlands, sometimes arise (usually obliquely) in discussion. These need to be carefully investigated, and we have used interviews with selected informants to gain a better understanding of the issues before raising the question of community management of resources in open discussion.

Development potential: Innovator exchange workshops: A discussion of farmers' experiences in their own development efforts is a useful starting-point for prioritizing development options and testing/adapting farmer-designed interventions. The exchange of ideas among local innovators is a good way of encouraging the dynamics of farmer-controlled development. These discussions can serve as an entry point for 'outsider' suggestions that can be incorporated into local attempts without imposing solutions. In the vlei project the Oxfam extension worker has attempted to form farmer groups with a common interest in vlei development and it is hoped that these can be the focus for the design and testing of vlei cultivation techniques, low-cost irrigation technologies, vlei wells and ponds and fish farming systems in the future.

Sustainability analysis

A vast array of often disparate, apparently unconnected information and ideas can be generated through a single farmers' workshop. The aim, however, is to generate useful questions for research and development, and flow diagrams and seasonal calendars help to distil out the ecological and economic problems and opportunities. One example from the vlei project illustrates the results of their 'sustainability analysis'. The phenomenon of dry-season (August–September) water-rise, is central to the production success of vleis, allowing relay cropping, diversification of crops and early marketing. The key questions now become: What are the determinants of this phenomenon? What aspects of watershed management are necessary to ensure its continuation? How can late dry-season water be more fully exploited in the development of vlei production?

Defining the action/research agenda

The process of appraisal involves taking an interdisciplinary view based on farmers' perspectives and local knowledge. Hopefully what is generated is a set of useful questions for further attention, some of which will need to be addressed by different components of the administration, extension and research structure. Some examples are:

- (i) Policy questions: vlei cultivation is officially discouraged for conservation reasons.
- (ii) On-farm research questions: some farmer-derived technologies can be tested immediately, but other trials may need to be more structured and be either farmer- or researcher-managed.

- (iii) **Basic research questions:** can be referred to appropriate institutions such as research stations (e.g. the causal factors in the rise of dry-season water tables).
- (iv) **Extension or implementation questions:** practical issues of what further action needs to be taken.

The Tree Resources Project

Tree resources have been another problem area pointed to by farmers in Zvishavane District. Farmers argue that trees are needed for a wide range of uses — as firewood, timber and browse in the communal woodlands; for fruit, shade and windbreaks around homes; and for fertility inputs and fencing in arable lands. This calls for a multispecies approach to rural afforestation. In dry areas trees adapted to the local environment can help to meet this need. People in different areas point to different problems. For some, firewood or poles may be in critical shortage; others want to increase trees in fields or to establish fruit trees around homes. The resource problems require a locally focused planning approach and an adaptive strategy of extension using a variety of tree species. Current policy which essentially offers just the gum tree/woodlot package has failed to consult farmers in the dryland areas about their priorities.

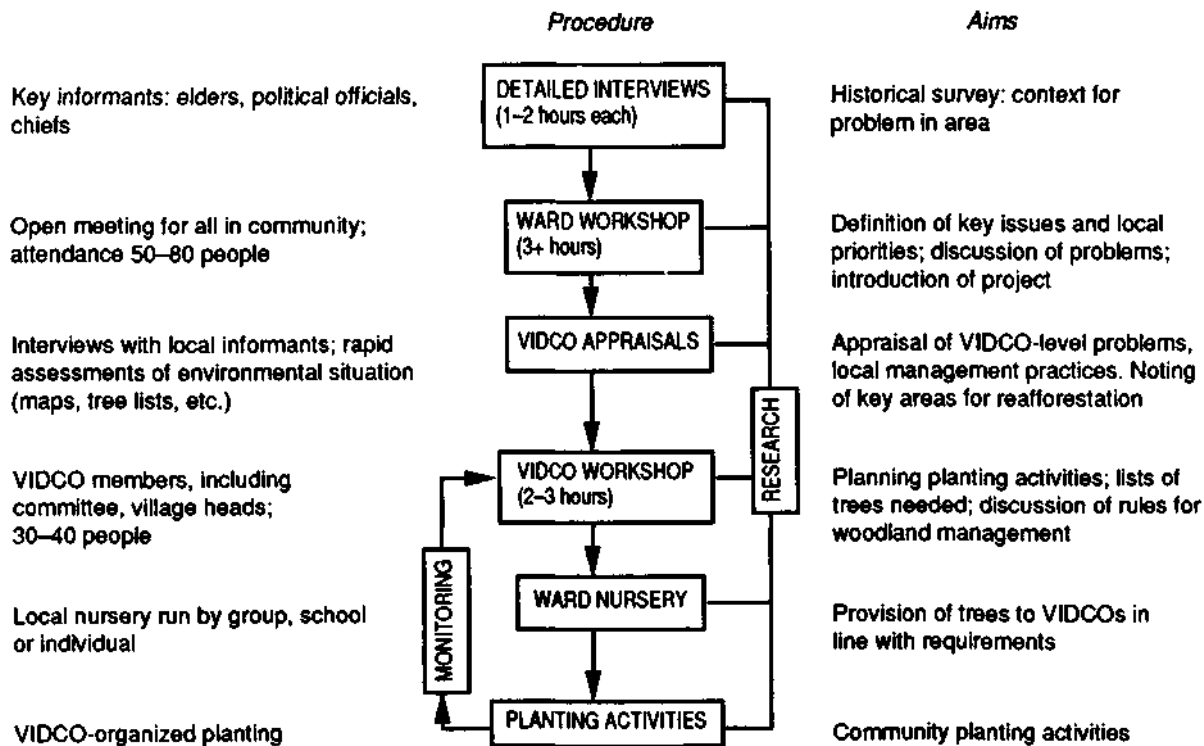
The trees project is evolving a local planning approach to extension that is aimed at providing locally-appropriate community forestry options. The techniques used are basically the same as those used in the vlei project described earlier: a combination of group and individual interactions between extension worker, researcher and local communities that are aimed at encouraging participatory planning and involvement in natural resource development.

An outline of the procedure being followed is given in Figure 1. It is managed by a locally resident extension worker and is closely supported by a small research effort. In contrast to the vlei project which has been focused on problem and opportunity identification, the trees project is implementation oriented. This leads to different requirements. Discussion workshops, especially when held at ward level when the project is being introduced, are preferably large groups since the project is aimed at whole community involvement at the outset rather than at encouraging participation of a representative sample in the research and design process.

However, there is still a need for focused appraisal, concentrating on particular 'user groups' (e.g. women and the firewood question) and a continuing requirement for a research input to study the historical context, to investigate local suggestions and monitor progress. The extension worker does much of this investigation in the course of extension activities, but is supported by the project co-ordinator.

The project aims to assist tree planting in fields and around homes, but also aims to encourage planting and community management initiatives in the

Figure 1: PROCEDURES IN THE TREE RESOURCES PROJECT



communal indigenous woodlands. The Village Development Committee (VIDCO) structure is proving a more or less appropriate scale for community planning of tree resources. The pilot project has completed the local planning phase in Mototi Ward, Mazvihwa Communal Land.

This has revealed an immense diversity of extension needs. This is not only determined by differences in the local environment (e.g. hilly, sandy soil areas vs. heavy soil plains), but also by differences in management abilities and locally-specific requirements. For instance, among the six VIDCOs, two have planned for indigenous tree planting in the communal grazing area, one needs a gum tree woodlot for a local pole shortage, one was particularly concerned about woodland management and needed to resolve a conflict between neighbouring communities over the use of trees within the grazing area, and all wanted a mix of indigenous and exotic fruit trees for planting around homes.

This diversity reflects a very real patchiness in natural resource situations and highlights the necessity of a localized planning and management approach. This allows communities to become involved in their own resource issues and empowers them to act upon perceived problems.

Methodological Issues

Indigenous technical knowledge

The use of local knowledge can be an invaluable tool in designing focused research agendas, suggesting appropriate technological interactions and adapting extension messages. The important advantages of indigenous technical knowledge, as experienced in the Zvishavane project, should be reiterated:

- (i) **The identification of problems.** Farmers necessarily have a holistic view of the farming system, unconstrained by disciplinary training, which enables the identification of key problems and opportunities often not apparent from a commodity-based or single-enterprise perspective. The identification of the vleis resources potential for arable and livestock production is an example.
- (ii) **Detailed baseline observation.** Farmers are often skilled observers and can contribute an immense amount to the basic understanding of agro-ecosystem functioning. Detailed observation, often within an extended time-frame, allows a qualitative insight for further investigation that is often ignored.
- (iii) **Classification.** Local classifications or typologies are essential to make the subsequent appraisal workable and locally applicable. Classifications derived from indigenous perceptions are generally very effective (Howe and Chambers, 1979).
- (iv) **Historical/local context.** The value of gaining a local and time-based perspective to appraisals for development has been repeatedly stressed above. The only source of this contextual information is local knowledge.

- (v) **Rapid assessment.** With limited resources available for exhaustive research on every facet of the problem, techniques that are rapid and cost-efficient, as well as cost-effective, are necessary. The research for the vlei project appraisal has been carried out at a number of 3–4-hour workshops and during a series of in-depth interviews lasting 1–2 hours. The cost has been minimal as these workshops and interviews have fitted into the ongoing programme of research and extension work in the area.
- (vi) **Farmer involvement.** Farmer participatory research should not simply extract information and co-opt farmers in the research process; they should be fully involved. The revelation that their own knowledge and experience is valuable and that they can be part of the determination of local development is an important aspect. This has been a central aim of the vlei project.

There are limits, of course, to the role of indigenous technical knowledge. Local knowledge is rarely as effective in defining causality as reductionist scientific investigation. For instance, the explanation for the dry-season water rise has been variously described as the result of 'boiling underground water like a kettle', the power of benevolent ancestral spirits, and the release of water from mysterious underground caves.

Group Workshops

The vlei project has used group workshops for much of its investigation. These have a number of benefits, problems and requirements. Workshop discussions, if well facilitated, can generate dynamic and open discussions. An unstructured format is essential, as a comment from one person can spark off a train of discussion from others.

Workshops are a good place for eliciting insights on technical issues or exchanging views on appropriate technologies. For politically sensitive or secret matters a less public encounter is desirable. Similarly, for issues where there is a diversity of situations — especially socio-economic or gender based — a selected 'focus' group is preferable. Open group workshops are sometimes dominated by 'better' (usually richer) farmers or political officials — always men.

This can be overcome to some extent by successful facilitation and arrangement of the workshop. It is essential to avoid letting an appraisal workshop coincide with a political meeting or a standard extension worker's meeting. The informal, participatory and unconstrained atmosphere of the research workshop is vital to its success.

With the right atmosphere, workshops are a fruitful place for the successful interaction of researchers, extension workers and farmers. Researchers are forced to address development issues and farmers' priorities, extension workers are required to be responsive and investigative, and farmers are allowed a voice.

Grazing Schemes and Participatory Research

The Communal Lands are generally viewed as being both overstocked and overgrazed. The consequences are said to be low levels of productivity and a serious threat of irreversible degradation. The two most commonly suggested solutions are (a) a restriction of stock numbers to within the carrying capacity of the veld, and (b) improved grazing management by means of fenced paddocks (i.e. 'grazing schemes').

These are not new ideas: in one form or another they have informed state interventions in peasant land-use systems since the 1930s, when Alvord introduced the notion of 'centralization'. An examination of the history of these interventions reveals that virtually all of them failed in their objectives, in some cases (e.g. the Native Land Husbandry Act of 1951) because they generated widespread political opposition. Coercive state action to enforce compulsory destocking has always been resisted, either covertly, with farmers 'hiding' their animals in various ways, or in the form of support for guerrillas promising an end to state interference in peasant agriculture (Beinart, 1984; Ranger, 1985).

In the early 1970s, however, the promotion of Short Duration Grazing schemes proved more successful, particularly in Masvingo Province. No mention was made by extension staff of destocking measures, and instead the benefits to veld and cattle were emphasized. A much greater effort was also made to involve community leadership in the delineation of resource boundaries and in the active management of these schemes (Froude, 1974; Danckwerts, n.d.)

Since Independence grazing schemes have again been promoted and a number of pre-Independence schemes have been resuscitated. A survey in December 1986 revealed 50 schemes which claimed to be operating and a further 56 at the planning stage (Cousins, 1987). Voluntary adoption and community mobilization have been strongly emphasized by Agritex. Recently the National Conservation Strategy has reiterated the need for 'planning [which] will involve the active participation and commitment of the local communities and not be imposed upon them' (Zimbabwe, 1987, 23).

On the other hand, government policy has continued to pull strongly in the direction of 'adjusting stocking rates to within carrying capacity' (Zimbabwe, 1987, 25) and 'destocking where necessary' (Zimbabwe, 1986, 27). These two objectives — popular participation in land-use planning on the one hand, and reduction in stock numbers on the other — sit very uneasily together. The overwhelming evidence from research carried out by the Farming System Research Unit and others is that 30–40 per cent of households in the communal areas own no cattle at all, and that the majority of households have insufficient access to draught power (Zimbabwe, 1984; Farming System Research Unit, 1985). Lack of adequate draught power constitutes a major bottleneck in crop

production, and so most people have a strong need to increase rather than decrease their herds (Shumba, 1984; Cliffe, 1986).

This is a complex issue and clearly not amenable to simple solutions. Part of the answer undoubtedly lies in policy shifts which would allow a much more substantial resettlement programme, more 'Model D' resettlement schemes, and the granting of permission to communal area farmers to purchase adjoining farms or ranches. All of these would address the problem by increasing the grazing area available to hard-pressed communities, and are currently the subjects of discussion within rural communities themselves.

Institutional development which allows for the effective management of common property resources also needs to be encouraged, and those communities which are already operating grazing schemes are an important source of learning about what is likely to work. In the Tagarika scheme in Mwenzi District, for example, the community has begun to discuss the principle of allocating equal shares of grazing rights, with redistribution effected by means of traditional mechanisms of lending out cattle (*kuronzera*).

But there are also technical issues to be addressed, in particular, the thorny question of stocking rates and carrying capacity, and again a participatory approach to research and extension may assist in the development of sustainable solutions to this pressing problem.

It has become clear over the last few years that terms such as 'carrying capacity' are not as unproblematic as they were once thought to be. An intense debate as to the precise definition and application of such concepts is now under way, with at least three different viewpoints being expressed: the conventional wisdom of mainstream veld and pasture science, the dissenting voice of Sandford and others, and the provocative stance adopted by Savory and advocates of Holistic Resource Management (see Cousins, 1987, for an extended summary of these positions).

These debates have been prompted by contradictory sets of evidence: on the one hand, the vegetation of the communal areas is undoubtedly very heavily utilized by livestock, and in some areas the soil is very poorly covered. In these situations serious soil erosion is probably occurring, although we have little in the way of direct measurements of the extent of permanent soil loss (Van den Wall Bake, 1986).

On the other hand, although concern over stocking rates and environmental degradation in communal areas was first expressed in the 1920s, livestock numbers have continued to increase and are today probably well over the three million mark. Most Communal Lands are carrying numbers of animals which are at least twice those recommended using conventional estimates of carrying capacity. But many cattle, particularly in the higher rainfall regions, can be

observed to be in excellent condition right at the end of the dry season, and after a drought year. As Sandford has commented:

When actual stocking rates . . . are far in excess of carrying capacities for long periods of time then one should ask whether this apparent prolonged defiance of the Laws of Nature may not have been due to an initial underestimate of the true carrying capacity (Sandford, 1982, 57).

Sandford recommended basic research on the relationship between stocking rates, primary productivity and soil erosion, and applied research on optimum stocking rates related to the needs of peasant farmers. Unfortunately this recommendation was not acted upon, and valuable time has been lost. Tensions between the central state and local communities on the issue of land-use and settlement patterns are emerging again as the result of the pilot villagization programme, and the National Conservation Strategy announces that Agritex will undertake land-use planning in all VIDCOs within seven years. To avoid a damaging confrontation on stocking rates we urgently need to have a much better idea of the true ecological carrying capacity of communal area grazing land.

Grazing schemes, as currently designed, are a technological intervention based on an ecological model which is increasingly in question. The assumption has been that if Short Duration Grazing works on large-scale commercial ranches then it must surely be appropriate for communal areas as well — in short, a prime example of the Transfer-of-Technology paradigm.

The community-based research being carried out in Mazvihwa has begun to address both the underlying issue of ecological carrying capacity and the question of appropriate management strategies for improved and sustainable livestock production. Again, the methods have been participatory in character and similar to those used in the vlei and tree projects. Since this aspect of the research is still in an embryonic phase, it will be only briefly summarized.

From interviews with individual farmers, group discussions of the kind described above, and also from direct observations of farmers' practices and livestock behaviour, some of the properties of the dryland farming system have been identified. Two types of savannah ecosystem may be distinguished: a dystrophic type, characterized by granitic sands, in which soil nutrients constitute the major constraint, and a eutrophic type, in which soils are either clays or loams and the major constraint is soil water. These correspond broadly to the local classifications of soil types and vegetation known as *mucheche* and *chiwomvo*.

Also important are riverine areas, vleis, drainage lines, and all alluvial soils. These form only a small proportion of the total land area, but together with browse are crucial to the survival of livestock at the end of the dry season. They are also important for crop production, as discussed above. They thus constitute 'key resources' in an essentially heterogeneous agro-ecosystem.

In this environment a common method of coping with drought is to move livestock from the eutrophic areas to the dystrophic, which often involves lending animals for a period of time to individuals in neighbouring communities. Mobility is a strategy that reflects spatial as well as temporal variability of forage production.

Taken together, these insights into how the existing farming system functions suggest an alternative strategy for the management of forage resources. Instead of the costly fencing of large areas of poor quality land into paddocks, for the purposes of operating a conventional rotational grazing system, it may be more useful to concentrate on community regulation of access to the 'key resources'.

For example, portions of the grazed vleis could perhaps be fenced off and reserved for selected draught or milking animals, particularly towards the end of the dry season. In general the heterogeneity of the environment needs to be recognized, and flexible, adaptive management strategies need to be devised to make optimum use of it.

Most importantly, however, to develop workable strategies the farmers themselves would have to be involved in the planning process, contributing their own knowledge of the local environment and suggesting possible avenues for further investigation and trials. The Transfer-of-Technology model, from which present-day grazing schemes seem largely to derive, needs replacing with an approach which involves research, extension and resource planning in a dynamic adaptive and learning process.

CONCLUSION

In effecting a marriage of extension and research in a participatory framework the analytical techniques and adaptive extension procedures used by the vlei and tree projects may prove useful. A participatory approach necessarily acts in a complementary way to existing strategies. It is not intended to replace mainstream research and extension efforts, but to assist in their effective operation through existing institutional structures. The failures of the Transfer-of-Technology and package model, especially in the dryland areas of Zimbabwe, suggest that the time is right to try an alternative approach.

References

- ADAMS, J. 1987 'Wage Labour in Mutirikwa Communal Land, Masvingo' (Harare, Univ. of Zimbabwe, Centre for Applied Social Sciences, Seminar Paper).
- BEINART, W. 1984 'Soil erosion, conservationism and ideas about development: A Southern African exploration, 1900-1960', *Journal of Southern African Studies*, XI, 52-83.

- CHAMBERS, R. AND GHILDYAL, B. P. 1985 'Agricultural research for resource-poor farmers: The Farmer-First-and-Last model', *Agricultural Administration*, XX, 1-30.
- CHAMBERS, R. AND JIGGINS, J. 1986 'Agricultural Research for Resource-Poor Farmers: A Parsimonious Paradigm' (Brighton, Univ. of Sussex, Institute of Development Studies, Discussion Paper 220).
- CLIFFE, L. 1986 *Policy Options for Agrarian Reform: A Technical Appraisal* (Harare, FAO).
- COUSINS, B. 1987 *A Survey of Current Grazing Schemes in the Communal Lands of Zimbabwe* (Harare, Univ. of Zimbabwe, Centre for Applied Social Sciences).
- DANCKWERTS, J. n.d. *A Socio-economic Study of Veld Management in Tribal Areas of the Victoria Province* (Salisbury, Tribal Areas Research Foundation of Rhodesia).
- DRINKWATER, M. 1987 'Exhausted Messages, Training and Groups: An Evaluation of Zimbabwe's Training and Visit System' (Harare, Univ. of Zimbabwe, Dept. of Agricultural Economics and Extension, Working Paper).
- FARMING SYSTEMS RESEARCH UNIT 1985 *Annual Report* (Harare, Dept. of Research and Specialist Services).
- FARRINGTON, J. AND MARTIN, A. 1987 *Farmer Participatory Research: A Review of Concepts and Practices* (London, Overseas Development Agricultural Administration (Research and Extension) Network, Discussion Paper 19).
- FROUDE, M. 1974 'Veld Management in the Victoria Province Tribal Areas', *Rhodesian Agricultural Journal*, LXXI, 29-37.
- HOWES, M. AND CHAMBERS, R. 1979 'Indigenous technical knowledge: Analysis, implications and issues', in *Institute of Development Studies Bulletin*, X, ii: *Rural Development: Whose Knowledge Counts?*, 5-11.
- HUSSEIN, J. 1987 'Agro-climatological Analysis of Crop Growing Seasons in Natural Regions III, IV, and V of Zimbabwe' (Harare, Agritex Workshop on 'Cropping in the Semi-arid Areas of Zimbabwe').
- JACKSON, J. C. 1987 *Rural Development Policies and Food Security in Zimbabwe: Part II* (Geneva, International Labour Office).
- JONES, E., NYAMUDZA, P. AND NYATI, C. 1987 'Rainfed Farming in Natural Region V' (Harare, Agritex Workshop on 'Cropping in the Semi-arid Areas of Zimbabwe').
- MOMBESHORA, B. 1985 'Livestock production research', in M. Avila (ed.), *Crop and Livestock Production Research for Communal Areas* (Harare, Dept. of Research and Specialist Services, *Zimbabwe Agricultural Journal Special Report 1*), 84-96.

- MOYO, S. 1986 'The land question', in I. Mandaza (ed.), *Zimbabwe: The Political Economy of Transition: 1980-1986* (Dakar, Codesria), 165-201.
- RANGER, T. 1985 *Peasant Consciousness and Guerrilla War in Zimbabwe* (Harare, Zimbabwe Publishing House).
- SANDFORD, S. 1982 'Livestock in the Communal Areas of Zimbabwe' (Harare, Ministry of Lands, Resettlement and Rural Development).
- SCOONES, I. 1987 'Key Properties of Dryland Farming Systems in Zimbabwe's Communal Areas: Issues for Research and Development' (Harare, Univ. of Zimbabwe, Dept. of Agricultural Economics and Extension, Seminar Paper).
- SHUMBA, E. 1984 'Animals and the cropping system in the communal areas of Zimbabwe', *Zimbabwe Science News*, XVIII, 99-102.
- VAN DEN WALL BAKE, G. W. 1986 'The siltation and soil erosion survey in Zimbabwe', in R. F. Hadley (ed.), *Drainage Basin Sediment Delivery* (Wallingford, International Association of Hydrological Sciences, Publication 159), 69-80.
- WEINER, D. 1988 'Land and agricultural development', in C. Stoneman (ed.), *Zimbabwe's Prospects* (London, Macmillan), 63-89.
- WHINGWIRI, E. *et al.*, 1987 'The Package of Higher Maize Yields in the Semi-arid Zones (Natural Regions III and IV): Is It Economical?' (Harare, Agritex Workshop on 'Cropping in the Semi-arid Areas of Zimbabwe').
- WILSON, K. 1986 'Aspects of the History of Vlei Cultivation in Southern Zimbabwe's Communal Areas' (Harare, Univ. of Zimbabwe, Dept. of Civil Engineering, Seminar Paper).
- ZIMBABWE 1984 *Report on the Demographic Socio-economic Survey of the Communal Lands of Masvingo Province 1983/84* (Harare, Central Statistical Office).
- ZIMBABWE 1986 *First Five-Year National Development Plan 1986-1990: Volume I* (Harare, Ministry of Finance, Economic Planning and Development).
- ZIMBABWE 1987 *The National Conservation Strategy: Zimbabwe's Road to Survival* (Harare, Ministry of Information, Posts and Telecommunications).

