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PESTICIDES AND POISONINGS IN ZIMBABWE: THE EFFECTIVENESS OF REGULATIONS

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ABSTRACT

PESTICIDES AND POISONINGS IN ZIMBABWE: THE EFFECTIVENESS OF REGULATIONS

By

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This thesis looks at the structure of regulations for pesticides in underdeveloped countries, using Zimbabwe as an example. The focus of this thesis is on the dependency relationship that Zimbabwe has with developed countries, within which Zimbabwe must set regulations for pesticide use. It presents a hypothesized model of regulatory influences on the periphery which effects Zimbabwe's domestic regulations and their effectiveness. The relationships between the different components of this model are discussed and illustrated. It is argued that regulations may, in certain situations perpetuate poisoning. The method of data collection was that of documentary research.

To

my parents who planted seeds of awareness

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To my husband, Richard Hasler, I extend my thanks and appreciation for his belief in my work, his help, and constant support. Without his backing, this thesis would not be what it is today.

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CHAPTER I

INTRODUCTION

"One for the rock, one for the crow, one for to rot and one for to grow."
-M.B. Green

Identification of the Problem

With the joy of marriage comes the celebration which expresses this happiness. In a rural area in Zimbabwe, Africa, a family prepares for this occasion by brewing local beer in a container over an open fire. Containers are a rare possession in these areas, so one uses what is available. On this particular occasion, the family used a left-over pesticide container, once containing the highly toxic chemical Phosdrin. The joyous event of the wedding turned into a tragic nightmare with fourteen of the wedding party members dead.

Why did this incident occur? Why are there so many similar cases of poisoning? This thesis attempts to explain why such incidents occur by looking at the structure of regulations for pesticides in Zimbabwe. It is believed that one aspect of pesticide regulations is to control the use of toxic chemicals so as to limit poisonings of humans and the environment. Therefore, if poisonings are occurring, one must analyze the components effecting pesticide regulations in Zimbabwe

to try to understand, what has been seen as, their "ineffectiveness". It is argued that the nature of the regulatory structure in Zimbabwe often detracts from the effectiveness of regulations. A central hypothesis in this thesis is that although regulations are intended to prevent poisoning, in certain cases they in fact perpetuate it.

Although, the components effecting pesticide regulations in Zimbabwe are many, a few crucial ones have been identified in this thesis, warranting analysis.

Zimbabwe has an established dependency relationship with some developed countries (i.e., through aid packages from the west, technological assistance, transnational corporations, etc.), within which Zimbabwe must set pesticide regulations. This relationship has strong influences on Zimbabwe's domestic pesticide regulations, which are outlined in this thesis.

The structure of regulations in developed countries has important ramifications for domestic regulations in underdeveloped countries. In this thesis, the United States domestic regulations and the ways in which they are established are focused on to see what affect they have on Zimbabwe's domestic regulations.

Another component effecting Zimbabwe's pesticide regulations are political and economic factors within

Zimbabwe. This thesis therefore concentrates on an analysis of political and economic factors which affect the structure of regulations.

All three of these components of the structure of regulations in Zimbabwe have a direct bearing on pesticide poisoning of farmers and laborers on commercial farms. The intention here is that at a later date communal farmers' and commercial farm laborers' decision-making network will be researched and documented. Therefore, this thesis hopes to lay the broad groundwork for a future field research project by presenting a macro-perspective of the structure of regulations that affect poisonings of communal farmers and farm laborers.

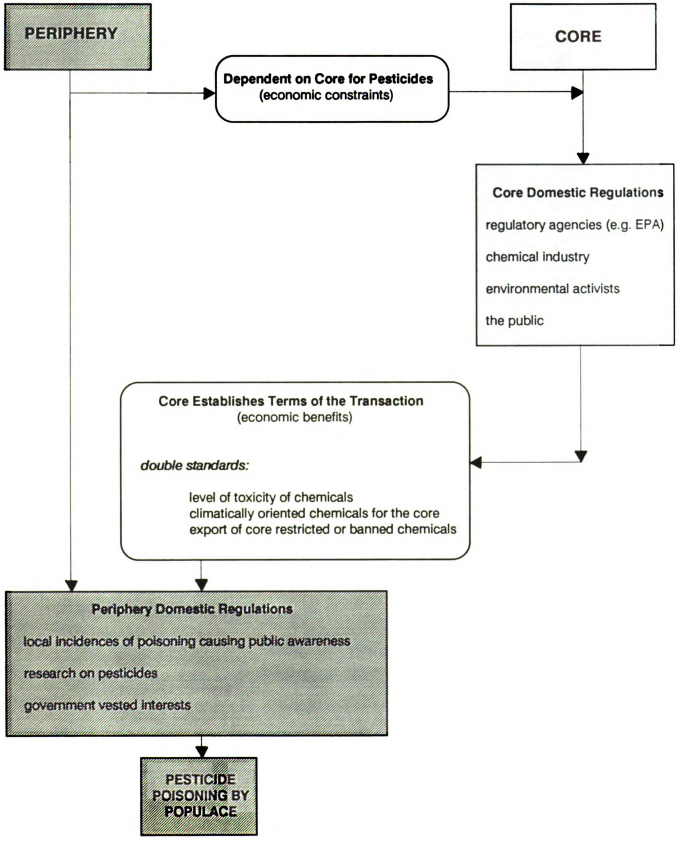
Core/Periphery Dependency Relationship

The structure of regulations for underdeveloped countries (see Figure 1) is affected by a dependency relationship between developed and underdeveloped countries. This relationship is influenced by economic constraints of the latter and economic benefits of the former. Dependency is seen here in line with Raul Prebisch's definition of dependence as "the relations between centres and the periphery whereby a country is subjected to decisions taken in the centres, not only in economic matters, but also in matters of politics and

strategy for domestic and foreign policies" (Chilcote 1984, 26). According to Prebisch, the world is divided into two parts, "a centre of industrialized countries and a periphery of underdeveloped countries" (ibid, 23). This thesis uses this dependency theory model as a heuristic tool to analyze how regulations for pesticides in underdeveloped countries are affected by the relationship with the "core" and the implications of this relationship on communal farmers and commercial farm laborers.

FIGURE 1

Model of Regulatory Influences on the Periphery



As mentioned above, Prebisch sees the core as influencing the domestic policies of the periphery. Such is the case with the domestic policy of regulations for pesticides in underdeveloped countries. As diagramed in Figure 1, because of economic constraints and other factors, to be discussed in detail later, the underdeveloped country must rely on the developed country for the supply of formulated pesticides or active ingredients for the formulation process. This becomes an exploitative relationship as the core establishes the terms of the transaction through the chemicals it exports to the periphery. This relationship challenges the whole notion of technology transfer whereby the underdeveloped country is attempting to compete in the world system for economic development through technological advancements, yet is inadvertently controlled/undermined by the core (see discussion on Technology Transfer p. 18).

The core has internal regulatory agencies and other influences which effect its own domestic pesticide regulations. The decisions that are made internally in the core about pesticides (e.g. to ban DDT) affect what goes on in the world system and the periphery. In effect, the decisions for the core are made with limited consideration for the periphery and double standards exist in the implementation of these regulations (see p.

8 and the discussion on The Pesticide Regulatory Bodies in the United States p. 20).

The transfer of pesticides from the developed to the underdeveloped countries constitutes an unequal exchange since the developed country establishes the terms of this transfer. This unequal exchange occurs through:

-the core exporting pesticides banned or restricted in their country;

-the export of extremely toxic pesticides which require precautions and special training for their use; and

-the export of pesticides produced for specific climatic conditions[1].

In principle, unequal exchange enables almost unlimited exploitation of a peripheral country by a core country. Most underdeveloped countries do not belong to the three international regulatory bodies that presently exist: the United Nations Food and Agriculture Organization (FAO), the Codex Alimentarius Commission (Codex), and the International Program on Chemical Safety (IPCS) (see

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[1]For example, pesticides manufactured in the United States are tested and researched for those conditions existing there (e.g., soils, temperature, seasons (application usually occurring in the dry season, rather than the rainy season as in Zimbabwe). Pesticides consistencies change in the United States when exposed to drastic changes in temperature. What affect does the soil conditions and climate conditions have on United States manufactured pesticides used in Zimbabwe?

Prabhu 1988, pp. 43-45). These organizations are therefore ineffective in controlling pesticide transactions. An apt illustration of how the core manipulates these transactions is the export of toxic waste to Africa (see "The Dumping Grounds", South, August 1988, pp. 37-41). Transactions like this in turn influence the nature of the periphery's domestic regulations (see discussion on International Pesticide Regulations p. 24).

The periphery's economic constraints bind it to import the core's pesticides, be they banned or restricted in the core. Consequently, the periphery's domestic regulations must account for these chemicals and justify their presence. This justification often leads to the ineffectiveness of regulations and potential poisoning of the local population (see discussion on Pesticide Regulations in Zimbabwe p. 46).

The preceding discussion was intended to give the reader an outlined understanding of what is meant by the "structure" of regulations for underdeveloped countries based on Figure 1.

It is argued that regulations may perpetuate pesticide poisoning because of a number of factors. These are:

1) The debate that occurs in the United States between the Environmental Protection Agency (EPA) and the

chemical companies on criteria for setting regulations influences what will be exported as banned pesticides. The time involved in resolving this debate in order to set regulations in the United States perpetuates poisoning in this country. Once a chemical is banned in this country, large quantities of it are frequently "dumped" cheaply on underdeveloped countries.

2) Underdeveloped countries in turn suffer from shortages of foreign exchange and officials in these countries tend to make decisions on what pesticide to import on an economic basis. Cheap pesticides are attractive to underdeveloped countries.

3) Attempts at formulating international regulations for underdeveloped countries (e.g., Codex Alimentarius Commission[2]) are thwarted by the disagreements that occur in the United States and other developed countries over the criteria of banning pesticides. The import of banned pesticides by underdeveloped countries also thwarts this process and results in a "double-standard" syndrome.

4) Regulations in underdeveloped countries are

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[2]This commission was set up in the 1960's by the Food and Agriculture Organization (FAO) and the World Health Organization (WHO) "with a broad mandate in the area of food standards" (Boardman 1986, 10). Unfortunately, very few underdeveloped countries are members of Codex. Zimbabwe is not a member.

influenced by vested interests of the government and elites. Banned pesticides may be translated into economic and political assets for certain groups in the society. Furthermore, these countries often lack the technical expertise required for testing the level of harmful effects resulting from use of a pesticide.

5) Within underdeveloped countries, the following factors are often ignored in the periphery's domestic regulations:
   a) lack of attempts to write instructions in all local languages and problems of illiteracy;
   b) lack of awareness of potential hazards of pesticide use;
   c) lack of coherent instructions on how to apply pesticides; and
   d) different climatic and agronomic conditions (pesticides may act or react differently from conditions in the core, see footnote 1).

If, as Weir and Schapiro (1981, 3) suggest, "someone in the underdeveloped countries is poisoned by pesticides every minute", then there is a dire need to investigate the structure of regulations outlined in Figure 1. The relationship between the core and the periphery, as it affects regulations, must be understood.

When a farmer in an underdeveloped country decides to use a pesticide, the types and brands of pesticides to choose from have already been established by the government of that country. Farmers' choices are therefore constrained by a global system in which chemical companies and governments' decision-making processes and, more importantly, the regulations that they establish and enforce are important considerations.

Methodology

As has been mentioned, an aim of this thesis is to present the reader with a model of regulatory influences on pesticide use as it affects Zimbabwe. In order to accomplish this, this study has been carried out through documentary research using the following spectrum of materials: books, journal articles, newspaper articles, United States Congressional Hearings, personal communications with scholars in the field, United Nations documents and other sources. The rationalization for using secondary sources rather than collecting primary data was the lack of available primary data and the difficulty of organizing a research trip to Zimbabwe at the Master's level. As this thesis concludes, there is a necessity to do primary research on this topic. Therefore the intention of this thesis is to lay down the groundwork for a future research

project.

The constraints of doing this kind of research in the United States were: lack of up-to-date studies, a general lack of information on this topic and an inability to ask fundamental questions of crucial informants, such as, bureaucrats, ministers, and other officials dealing with pesticide issues. Another constraint was the general lack of studies and information on communal farmers' use of pesticides.

Documentation on the specifics of pesticide regulations and the regulating ministry in Zimbabwe is also limited. This topic warrants future research in order to understand and prevent further pesticide poisonings by farmers. The author's discussion of this topic is limited to personal deduction from reading materials available and conversations with Dr. George Bird, professor in the Department of Entomology at Michigan State University. Although at times there tends to be a lack of empirical data, these deductions warrant statement in order to understand the effectiveness or ineffectiveness of pesticide regulations in Zimbabwe.

Upon reading the various materials described above, I formulated a framework of analysis for interpreting this material to understand the complexity of setting regulations and their effectiveness.

Dependency theory is used in this thesis as an analytical tool, since, in spite of its shortcomings, it lends itself to the formulation of a structural understanding of the pesticide regulatory arena that Zimbabwe operates within to "protect" the health of its population. One of the inherent shortcomings of the world systems approach is its "static description of national features abstracted from the class realities which produce it" (Petras 1982, 151). This analysis, claimed to be "deduced from a static global stratification system" has been likened to the "functional requisites and equilibrium models of Parsonion sociology" (ibid, 152). This thesis acknowledges these shortcomings, but it is believed that dependency theory can provide some interesting insights into the issues associated with pesticide poisonings.

During the course of compiling this thesis I have had to justify the role sociology plays in the topic of regulating pesticide use in Zimbabwe. There is no need to restrict the applicability of sociology. If sociology is to develop as an applied social science, more studies, such as this one, will be needed to demonstrate the merit and dire need of sociology in understanding, challenging and assisting that realm that is usually considered "technical". Sociology must not be satisfied with developing surveys to please

bureaucrats. These usually end up stored in forgotten filing cabinets.

As has been mentioned, this thesis will concentrate on the regulatory systems implications in setting regulations for Zimbabwe. Chapter I presents a general picture of what the author's "model of regulatory influences on the periphery" and its components. Chapter II sets the scene of pesticide use in Zimbabwe by giving a brief outline of the agrarian structure and the chemical industry. Chapter III analyzes the economic constraints and political implications affecting regulations and their effectiveness, using examples from Zimbabwe. Chapter IV is the conclusion, and other relevant materials are included in Appendix A.

Pesticides Historically

The term "pesticides" is often used in a generic sense to refer to chemicals used to control all pests, be they noxious insects, fungi, weeds or rodents, as all of these are seen as pests in one way or another. Since the introduction of over 60,000 synthetic chemicals after World War II, the term "pesticides" has had a derogatory connotation when used to refer to agrochemicals in that it signifies great dangers. However, this term will be used in this thesis to refer to chemicals with no derogatory connotations intended.

Pesticides have become a very controversial and much debated social issue because of their dualistic nature; that is, they present both benefits and risks. If pesticides had not been invented and widely introduced, our population survival would still be widely threatened by parasitic diseases (e.g., malaria, trypanosomiasis, bilharzia), crop failure due to pest invasion (e.g., apple scab, cotton bollworm, corn rootworm), rapid house deterioration (e.g., termites, wood worms, army ants), famines (e.g., the potato blights in Ireland), and so forth.

> For instance it was estimated in the U.S., where statistics are more readily available, between 1951 and 1960 annual losses of potential agricultural production due to various causes were the following percentages of total production by weight: by weeds, 9%; by birds and small mammals, 2%; by insects and mites, 13%; by nematodes, 1%; by disease, 10%; overall total, 35% (M.B. Green 1976, 7).

Yet, it is important not to loose sight of the various alternatives to pesticide use and the integrated pest management techniques which exist (e.g., biological control, cultural control, mechanical control, sanitation techniques).

Although the use of DDT[3] has been banned in the United States since July 1972, Zimbabwe established only a partial ban in 1982. Even though the hazards of DDT are well documented, Zimbabwe needs to control malaria

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[3]A persistent insecticide which accumulates in the environment and the human body.

and tsetse flies in many of its rural areas. DDT is relatively inexpensive for Zimbabwe to import and also a stronger, less "risky" substitute has not yet been found. Without DDT, people would be vastly incapacitated by malaria and sleeping sickness. According to Simbarashe Mpofu (1988), there are two types of mosquitoes in Zimbabwe capable of transmitting malaria to humans, which are controllable with DDT. He states that if treatment is not sought within 18 to 24 hours after malaria symptoms appear, the illness could lead to death. Consequently, the Zimbabwean government has thus far spent over Z$2 million on malaria control programmes. The largest measure of control has been the spraying of the inside of huts with DDT.

Rachel Carson's Silent Spring (1962) began an era of awareness about both the potential and the documented hazards of continued pesticide use. Her book provoked recognition of ecological issues, especially of environmental degradation from pesticide use. Although, in the meantime her work has received strong criticism[4], she enhances awareness of the lethal aspect of pesticides dualistic nature. Health hazards to humans,

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[4] Her book is criticized for being one-sided and unbalanced in its analysis. Some reviewers felt that the problems she mentioned could be taken care of scientifically (Chemical Engineering Magazine). Others claimed that the "facts" stated were used out of context (Natural History Magazine).

chemical residues in consumers' food, environmental degradation, increased pest resistance and so forth, are the results of our heavy reliance on pesticides. In considering these increased problems, one begins to question whether pesticide use should be controlled? If so, by whom? Based on which standards and whose research?

Regulations Defined

At this point it becomes necessary to present a general definition of what is meant by "regulations". As Robert Boardman indicates, a clear, all encompassing definition does not exist. "Regulations" per se are defined differently for an individual government versus regulations across governments in an international spectrum. Two definitions will, therefore, be presented in line with these two regulatory environments. Regulations at the domestic level, particularly as far as the nations of the western industrialised world [the core] are concerned, refers to the relations between the state and the economy, or, more specifically between government and business" (Boardman 1986, 15). In the latter, international interactions found in the Charter of the United Nations or the General Agreement on Tariffs and Trade (GATT) focus on the establishment of regulations. In this context, Boardman defines

regulation as "the imposition of negotiated restraints on behavior" (1986, 15). Here, a regulation has to be debated internationally before becoming a shared standard.

What Boardman sees as two different regulatory environments, may in fact be one since the core strongly influences debate about regulations at both levels, but with differing motivations at each level. For example, chemical companies want to avoid poisonings in the core because of the negative publicity that this would generate, both among users and food consumers. This is not of much concern or a threat to chemical companies in the periphery because they usually have a lot more power and control as oligopolies, than the public. Furthermore, peripheral governments are often more supportive of chemical companies. They have economic vested interests in protecting these companies. On the other hand the powerless often have no voice, yet they are usually the ones poisoned by toxic chemicals.

Technology Transfer

"Development" is sought in many underdeveloped African countries through various advances in agriculture. Some of these measures include the use of manufactured products such as fertilizers, machinery and pesticides. Pesticide production, formulation and use

can lend itself to the establishment of new industries in underdeveloped countries, which then can cater to both the agricultural and industrial sectors of the economy.

> As a part of the over-all commitment to transfer of technology from the industrialized countries to developing countries, the United Nations Industrial Development Organization (UNIDO) sponsored group in-plant training programmes on the Industrial Production and Formulation of Pesticides in developing countries in Syracuse, New York and at selected industrial locations in the United States in July and August 1969 and 1970 (United Nations 1972, v).

Transferring technology to underdeveloped countries is seen as a means to develop them, yet it may be a way of ensnaring them.

According to Osita C. Eze, "before the independence of most underdeveloped countries, the political, legal and economic environment was set for transfer of technology transactions" (1986, 14). Thus the colonial legacy set up a capitalistic mode of production which in turn caused the independent African states to rely on the core for development, rather than on its own abundant labor resource. This reliance creates a dependency relationship of the underdeveloped countries on the developed, consequently hindering local technological development and self-reliance. Technology transfer is not a one time transaction; instead it is a continuing process on which the periphery relies. This is especially true with pesticides, since few

underdeveloped countries manufacture the active ingredients for pesticides because of a lack of materials for production, financial resources for operation, etc.

Technology transfer sees such transactions as "enriching" both the developed and underdeveloped countries (Basche and Duerr 1975, 1). The underlying reality is that technology transfer occurs between developed and underdeveloped countries mostly because of vested interests of the former and the economic necessity of the latter.

The Pesticide Regulatory Bodies in the United States

A crucial component of Figure 1 is the manner in which regulations are affected in the United States by pesticide regulatory bodies. It has been argued that the EPA and the chemical companies in the United States have similar vested interests (in terms of their tacit support of a growth oriented economy) and therefore there are allegedly weak regulations on hazardous pesticides. According to Robert Boardman, there has been "a long tradition in the United States of criticism of different kinds of regulatory bodies or administrative agencies for being too close and responsive to the industrial or agricultural sectors they were designed to regulate; the charge was repeated

in relation to various activities of the Environmental Protection Agency, for example on the issue of toxic waste disposal, in the late 1970's and early 1980's" (Boardman 1986, 19). The chemical companies usually have more funds available for doing sophisticated research, whereas the EPA is inhibited by the amount of government funding it receives. This frequently means that the kind of research done by this body is not as extensive as that of the chemical companies. Chemical companies' prime objective is to sell chemicals in order to make profits. When a chemical is banned the government has to buy up the supplies of this recalled chemical[5]. The EPA, as an agent of the government, has a vested interest in keeping factories going. Furthermore, test laboratories are sometimes deficient. In the 1970's a laboratory used by the EPA was found to be using inadequate testing methods. This created much doubt about the validity of the EPA's previous findings and influenced the entire international regulatory system (see **Pesticide Regulatory Program Study**)[6]. The

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[5]Presently, there is a proposal to revise FIFRA legislation by introducing FIFRA Lite, which would, for the most part, end government payments to chemical companies for buying banned chemicals. Up to now, these payments have totalled $20 million (Ferguson 1988, 22).

[6]Hearings before the Subcommittee on Department Operations, Research, and Foreign Agriculture of the Committee on Agriculture, House of Representatives, 97th Cong., 2d sess., Dec. 17, 1982 (Washington, DC: USGPO, 1983) p. 131.

pesticide industry has been referred to as a "secretive one" (Weir and Schapiro 1981, 9). The EPA guards its data from the public and from other public agencies. When it does make information public it is frequently ambiguous or difficult to interpret (see Weir and Schapiro 1981, p. 9 for a discussion of this).

Risk and Benefit Analysis Within the Core

Risk/benefit analysis was designed to be instrumental in producing "objective" facts for policy makers and regulatory agencies.

Economic vested interests and political alignments both within the core and between the core and periphery make "objective" risk assessment extremely difficult, if not impossible. This is also because risks are an aspect of perception and as Mary Douglas and Aaron Wildavsky (1982) have pointed out, these are culturally defined. They claim that there is no gap between perception and reality and that the real dangers are not known until "after the fact". In an attempt to ward off future dangers each social system stresses some risks at the expense of others. Social relations are built on a set of assumptions, values and attitudes which influence the kinds of risk that are important to particular societies. To use their example, "when we say that a certain kind of society is biased toward stressing the

risk of pollution, we are not saying that other kinds of social organization are objective and unbiased but rather that they are biased toward finding different kinds of dangers" (Douglas and Wildavsky 1982, 8).

Too often alleged "experts" on toxic risk are in the pay of large corporations and become little more than public relations officers. No doubt this state of affairs prompted Charles Perrow of Yale University to reach the following conclusions, "first, risk assessment is not primarily concerned with risk assessment per se but with the benighted public and its ill-informed role in social policy. Second, while most authors are pre-occupied with the public, the real issue is neither risk assessment nor public participation but economic and political power" (1982, 298) (see chapter III for a discussion of this).

Risk and Benefit Analysis Within the Periphery

It has been suggested to the author that the periphery is "free" to choose which chemicals it desires to import (i.e., unconditionally consider the risks and benefits of such a transaction) and that therefore the core does not dictate the transaction. Though there is some truth to this observation, it is an oversimplification of the political and economic context within which the core and the periphery have

transactions. Underdeveloped countries often lack the infrastructure to manufacture the active ingredients needed to make pesticides effective. They depend on the core for advances, technological advice and inputs.

International Pesticide Regulations

According to Robert Boardman, "there are presently no international regulatory agencies," which control the use of pesticides (1986, 3). There are institutions which have various regulations (see discussion on p. 7 on the three international regulatory agencies), but these are not comparable to the regulations a government can have operating in its home environment. Consequently, it is thought that the United States regulations should be used as the international regulations (this reinforces the view outlined on p. 7 that regulatory environments are essentially dominated by the core), since many United States manufactured pesticides are exported to underdeveloped countries (see Table 1[7]). Ostensibly, to avoid double standards, some people are advocating that the core should establish the regulations to be used by the periphery. This argument is a double-edged sword since the periphery attempts to have autonomy. However,

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[7]Although this table is no longer up-to-date, it gives the reader an idea of what pesticides the United States has exported to the periphery.

at present, "at least 25 percent of U.S. pesticide exports are products that are banned, heavily restricted, or have never been registered for use here" (U.S. General Accounting Office 1979, iii & 39). According to Weir and Schapiro, "the amount of pesticides exported from the United States has almost doubled over the last 15 years" (1981, 5).

> In 1977, U.S. exports to foreign countries totaled $120.1 billion. Among the vast numbers of American products exported annually are millions of dollars worth of consumer products, drugs, pesticides, devices, and chemicals which a U.S. regulatory agency has determined to be unsafe for domestic consumption (Committee on Government Operations 1978, 1).

The Reagan administration has set a trend of deregulating, which presents more freedom for exporting banned pesticides. This illustrates how events that take place in the core may influence what occurs at the periphery.

> An Executive Order issued late in the Carter Administration, establishing a system for notification of foreign governments when hazardous materials were shipped to their countries, has been rescinded. Reagan's plan emphasizes deregulation (Congressional Hearing 1983, 52).

With increased conflict on the United States front over pesticide regulations, it becomes difficult to set an international trend. Instead, international regulation trends are presently set by the terms of trade between the underdeveloped and developed country.

TABLE 1

SELECTED LIST OF CHEMICAL COMPANIES PRODUCING, BUYING, AND/OR SELLING HAZARDOUS PESTICIDES IN THE THIRD WORLD

COMPANY (U.S. unless otherwise noted)	PESTICIDES		
	A Banned or Heavily Restricted	B Under Review	C Unrestricted
Allied Chemical	Kepone, Mirex	--	--
Amvac	DBCP	--	--
American Cyanamid	Kepone, Mirex --	Toxaphene, 2,4-D	Malathion Parathion
BASF (W.Germ)	2,4,5-T	2,4-D	--
Bayer (W.Germ)	DDT, Heptachlor, Lindane	Toxaphene	Parathion
Celamerck (W.Germ)	Aldrin, Dieldrin,DDT, Endrin, Heptachlor, Chlordane, Lindane,2,4,5-T	Toxaphene, 2,4-D	Parathion
Chevron	DDT, Aldrin, Dieldrin, Heptachlor, Chlordane, Endrin, Lindane, BHC, Silvex	Toxaphene, Paraquat	Malathion
Ciba-Geigy (Swiss)	--	2,4-D	--
DOW	2,4,5-T, Silvex, DBCP	2,4-D	--
Dupont	--	EPN	Parathion
FMC	Heptachlor	--	Malathion
W.R.Grace	--	Toxaphene	--
Hercules	--	Toxaphene	--
Hoechst (W.Germ.)	DDT	--	Parathion Malathion
Hooker	BHC, Lindane, Mirex	--	--
Imperial Chemicals (UK)	BHC, Aldrin	Paraquat	--
Kerr-McGee Chem.	--	--	Parathion
Monsanto	--	2,4-D	Parathion
Montrose	DDT, Endrin	--	Parathion

TABLE 1 (cont.)

COMPANY (U.S. unless otherwise noted)	PESTICIDES A Banned or Heavily Restricted	B Under Review	C Unrestricted
Nissan (Jap.)	--	EPN	--
Pfizer	--	--	Malathion
Rohm&Haas	Silvex	Toxaphene	Parathion
Schering (W.Germ)	Aldrin, BHC, Heptachlor	--	Parathion
Shell (UK-Neth.)	Aldrin, Dieldrin,DDT DBCP,Endrin, 2,4,5-T	2,4-D	Parathion
Stauffer	DDT, Dieldrin	EPN, 2,4-D	Malathion Parathion
Sumitomo (Japan)	--	--	Malathion
Union Carbide	DDT, Mirex, Heptachlor, Chlordane, Endrin,	EPN	Parathion
Velsicol	Chlordane, Heptachlor, Phosvel, Endrin	EPN	Parathion

NOTE:

Category A: Those which are banned or heavily restricted inside the U.S. Most uses for these products have been outlawed, but important uses for some remain, such as termite control for Chlordane. Certain pesticides have recently been discontinued, including DBCP (Dow) and Kepone (Allied Chemical), but are included because they were important products for the companies involved.

Category B: Those which are under review for future regulatory action. Toxaphene, Paraquat and EPN are termed "suspect chemicals" by EPA.

Category C: Those which are unrestricted in the U.S. but which have caused human deaths in the third world. Parathion is reportedly the number one killer among all hazardous pesticides, banned or not.

Source: David Weir and Mark Schapiro (1981) Circle of Poison - Pesticides and People in a Hungry World. California: Institute for Food and Development Policy. pp. 79-81.

CHAPTER II

AN OUTLINE OF AGRICULTURE AND PESTICIDE USE IN ZIMBABWE

In order to understand the development of Zimbabwe's dependence on the core for the importation of pesticides, one must first have a picture of the socioeconomic history of Zimbabwe. This section briefly discusses Zimbabwe's history so as to paint a picture of its present political economy.

A Brief Political Perspective of Agriculture

Zimbabwe officially gained independence on April 18, 1980 after a fifteen year guerrilla war. Before that time, Rhodesia, as it was known, had a policy of dividing its land up along racial lines. The rural African population had to reside in designated areas which were called the "Tribal Trust Lands" (TTL). These lands were the driest and least fertile, yet housed more than 800,000 rural farmers, which was three times as many people as the land could sustain. This policy on the other hand secured the most fertile land for the less than 7,000 white commercial farmers.

> High on the plateau, these farms were well-watered, with easy access to the rail and road network that spread out from the major cities. The average white farmer owned more than 6,000 acres, but cultivated only half that much. During the civil war that finally led to independence, thousands of Zimbabwean men and women joined the liberation struggle in hope

> of getting more of this land for the black peasants (Seidman 1985, 1).

The Land Tenure Act of 1969, which was based on the Land Apportionment Act of 1930, was used as a political and legislative instrument to ensure a division of land along lines of skin color. This Act insured that the most agriculturally viable land was secured for the exclusive use of the commercial farmers. The commercial farmers developed much political power through this division and became a prominent class which required consideration in the political arena.

> At Independence (1980), the new government inherited not only a lopsided dualistic agricultural sector but also a pampered, powerful and yet hostile white agrarian bourgeoisie which had to be handled with extreme caution lest it frustrate the government's policies and programmes of transforming and restructuring the agricultural sector (Mumbengegwi 1986, 210).

Therefore, the new majority ruled government had to contend with this powerful minority group in both a cautious and pragmatic fashion in order not to upset the economic stability of the country which was dependent on the commercial farmers to attain the national objectives. According to Clever Mumbengegwi, "in 1980, the commercial sector accounted for 75% of gross output, 95% of marketed surplus, nearly 100% of agricultural export earnings and 33% of the national formal wage employment" (1986, 210). The commercial farmers had the desire to preserve the existing division of land with

very few changes, but the communal farmers saw independence as a means of accessing the vast portions of land legally forbidden to them before independence.

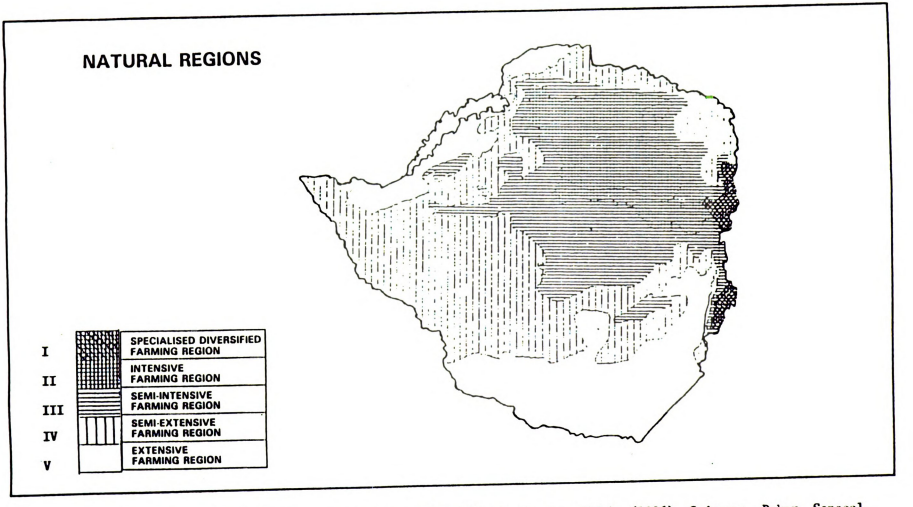
In 1980, the Zimbabwean government set out new agriculture objective policies which were outlined in the government publications "Growth With Equity" and "Transitional National Development Plan". Mumbengegwi states that "agriculture and rural development were singled out as top priority in the government's development plans" (1986, 211). The government sought to attain its objectives and redistribute the country's riches in terms of a socialist framework. Today one finds that the socialist rhetoric used to present these objectives and to cater to the majority population's aspirations is outweighed by practicalities since few major changes have occurred. This can be seen as an attempt to preserve the private sector which maintains the present capitalistic economic structure. Although some land redistribution has occurred, many commercial farmers still own and operate large and fertile plantations, thus maintaining the status quo. The six subsectors mentioned below, are however indicative of the redistribution that has commenced (see Table 2, p. 32).

Table 2 reveals what the land distribution trends have been since independence. Clearly, the table shows

that the natural and unreserved land (forests, parks and other non-farming) has increased since 1969; it has not been redistributed to the land hungry African populace. This reveals a pragmatic emphasis in the government's policy making. Wildlife and land preservation for tourism has great potential to enhance the foreign exchange contributions to Zimbabwe's development. An important note is that this land sometimes occupies more agriculturally suitable land (Natural Region I) than does the communal areas. The largest transfer of land has been to the resettlement sectors, with this land mostly coming from the large-scale commercial farmers. Most of the land transferred is classified in region III (see Figure 2, p. 32). Thus the large-scale commercial farmers have not really lost "land" per se and the communal farmers have not really gained any "land".

FIGURE 2

MAP OF ZIMBABWE



Source: Zimbabwe: The Political Economy of Transition 1980-1986, I. Mandaza (Ed.), (1986), Codesria, Dakar, Senegal.

TABLE 2

LAND DISTRIBUTION BY SUB-SECTORS, ACCORDING TO THEIR AGRO-ECOLOGY IN 1969 AND PERCENTAGE LAND REDISTRIBUTION BY 1984

	1969	1984	Natural Regions[8] I	II	III	IV	V
				(Percentages)			
Natural & Unreserved Land (forest, Parks & other non-farming land	14.4%	17.2%	0.3	0.9	2.1	6.5	6.0
Communal Lands (CLS)	41.5%	42.7%	0.2	3.1	7.0	18.1	12.8
Small-scale Commercial Farms (SSCF)	3.8%	3.5%	--	0.6	0.7	1.5	0.5
Large-scale Commercial Farms (LSCF)	40.0%	32.1%	1.2	9.8	5.6	9.7	5.7
Resettlement Areas	0.0%	4.5%	0.1	0.4	2.4	0.5	1.1
TOTAL			1.8	14.8	17.8	36.3	26.1

Source: Ibbo Mandaza (1986) Zimbabwe: The Political Economy of Transition 1980-1986. Senegal: Codesria. p. 185

1980 Proposed Agriculture Objectives

Robert Mugabe's government entered parliament on a ticket of many proposed objectives and promises for the African population. Many of these which had previously been excluded from Rhodesian government policy. According to Mumbengegwi, although some of the Mugabe government's agriculture objectives mirrored those set during Rhodesia's Unilaterally Declared Independence

[8]See map, Figure 2 on p. 32.

period (1965-1979), the changes were "aimed at achieving an acceptable and fair distribution of land ownership; elimination of discriminatory practices in output pricing, input provision, marketing, credit, extension, infrastructure and the provision of other back-up services; and raising peasant incomes through productivity-raising measures" (1986, 211). The focus of this thesis is on the objective of "input provision" and more specifically, the agriculture input of pesticides.

Zimbabwe's Agrarian Structure

Zimbabwe's land potential has been categorized into five natural regions (see Figure 2, p. 32) based on land-use which has been determined from the amount of rainfall an area receives and its diverse capabilities. This land division also presents the general recommended areas for cropping and livestock. These natural regions are a spatial aspect of the agrarian structure Zimbabwean farmers work within (see Table 3).

TABLE 3

LAND AREAS BY NATURAL REGION[9]

Natural Region*	Suitable Intensity of Land-Use	Land Area (1,000 ha)	Percent of Total
I	Specialized and Diversified Crops	705	1.8
II	Intensive	5,857	15.0
III	Semi-Intensive	7,290	18.7
IV	Semi-Extensive	14,770	37.8
V	Extensive	10,450	26.7
Total		39,072	100.0

*Note: Natural regions I and II are the best in terms of agro-ecological potential, where the majority of high value crops are grown, while regions IV and V have the most unreliable rainfall are best suited for extensive ranching.

Source: Ibbo Mandaza (1986) Zimbabwe: The Political Economy of Transition 1980-1986. Senegal: Codesria. p. 182

The colonial legacy of Zimbabwe maintains a division between the agriculturally rich, large scale commercial farms and the less fertile over-crowded, depleted lands used by communal farmers. Essentially, there are six agricultural "subsectors". These are, as classified by Sam Moyo (1986, 182):

1) Communal Areas (CAs)

2) Large Scale Commercial Farm Areas (LSCF)

[9]See map, Figure 2, on p. 32.

3) Resettlement Model A schemes

4) Resettlement Model B (Cooperative) schemes

5) Small Scale Commercial Farms (SSCF)

6) Small Farms

"The subsectors are distinguishable in terms of forms of land tenure, production organization, capital and technology investment levels and, coincide with the racial boundaries of the land ownership structure" (Moyo 1986, 183).

Crops Used By Subsectors

Zimbabwe's three main agricultural subsectors in regard to contribution to the country's total agriculture output are: the Communal Farmers, Small Scale Commercial Farmers, and Large Scale Commercial Farmers. These three areas compete in the production of cotton (an export crop), maize (a local food staple and export crop), groundnuts (a local food staple), and tobacco (a local consumption and export crop). Zimbabwe is the world's third largest exporter of tobacco.

Tables 4, 5, 6, and 7[10] reveal the contribution of these three main agricultural sectors in the above mentioned crops. The indication is that communal

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[10]Although Table 7 does not give a comparison of the subsectors tobacco contribution over several years (such a table was not available), it gives the reader an idea of how much each subsector contributed in 1979/80.

farmers have played a larger role in the output production of these crops since independence. Hence, the use of pesticides becomes a crucial input element for communal farmers in competing against large-scale commercial farmers who have had access to pesticides for many years.

TABLE 4

COMPARATIVE CONTRIBUTION OF COTTON DELIVERIES (IN TONS) ZIMBABWE'S THREE AGRICULTURAL SUBSECTORS (1982-1984)

YEAR/SECTOR	LSCF	SSCF	CFA	ARDA	TOTAL INTAKE
1982*	105,275	49,207			154,482
1983*	111,740	56,720			168,461
1984	138,728	7,768	80,776	22,972	250,244
TOTAL	355,743	113,695	80,776	22,972	573,187

*In 1982 and 1983, LSCF included ARDA (Agricultural and Rural Development Authority) while SSCF included C.F.A.

Source: Ibbo Mandaza (1986) Zimbabwe: The Political Economy of Transition 1980-1986. Senegal: Codesria. p. 176

TABLE 5

COMPARATIVE CONTRIBUTION OF MAIZE DELIVERIES (IN TONS) AMONG ZIMBABWE'S THREE MAIN AGRICULTURAL SUBSECTORS (1979-1985)

SECTOR	1979/80	1980/81	1981/82	1982/83	1983/84	1984/85
Peasant Communal Farmers	18,260 (3.6%)	41,380 (5.2%)	183,358 (9.7%)	229,472 (17.8%)	144,302 (23.4%)	341,673 (36.5%)
Small Scale Commercial Farmers	13,454 (2.7%)	17,964 (2.3%)	58,735 (3.1%)	40,836 (3.2%)	15,171 (2.6%)	54,421 (5.8%)
Commercial Large Scale Farmers	473,727 (93.7%)	725,297 (92.5)	1,650,483 (87.2%)	1,022,248 (79.0%)	457,486 (74,1%)	540,895 57.7%)
GRAND TOTALS	505,441	784,641	1,892,576	1,292,556	616,959	936,989

Source GMB Registry, Harare 1985 (mid-year)

TABLE 6

COMPARATIVE CONTRIBUTION OF GROUNDNUTS DELIVERIES AMONG ZIMBABWE'S THREE MAIN AGRICULTURAL SUBSECTORS

SECTOR	1979/80		1980/81		1981/82		1982/83*		1983/84*		1985/86
	Shelled	Unshelled	Shelled	Unshelled	Shelled	Unshelled	Shelled	Unshelled	Shelled	Unshelled	
Peasant Sector	122	933	231	1,387	146	1,725					55,500
Small scale Sector	175	165	262	185	129	284					
Largescale Sector	105	6,476	69	9,883	71	15,163					6,700

Source G M B Registry, Harare, 1985 (mid-year)
*Data not available

TABLE 7

BURLEY TOBACCO DELIVERIES BY SUBSECTOR

	No. of Growers	Total ha.	Mass sold	% Mass
1979/80				
Commercial	120	1,381	2,256,079	91.48
Small Commercial	46	27	17,089	0.69
Communal	584	235	193,204	7.83
Totals	750	1,643	2,466,372	100.00

Source: Zanu PF (1985) p. 38

Pesticide Use

All of the six subsectors use pesticides as an agricultural input, though the large scale commercial farmers use the most per unit of output.

Many underdeveloped countries find the development cliche of "self-reliance" difficult to attain when dependence on foreign inputs is so high. In 1985, Zimbabwe received US$347 million in external development assistance (Chimombe 1986, 124). Pesticides are a double edged sword in leading to agricultural self-reliance and exportable surplus. The use of pesticides

in Zimbabwe can increase the crop yield of all farmers in the six subsectors and thus lead to national self-sufficiency. But, many of the active ingredients are imported, although formulation occurs locally. This means that Zimbabwe has to rely on imports to develop pesticides for achieving self-reliance through increased crop yields. Agricultural output plays an important role in contributing to the Gross National Product (GNP) of the country and pesticide use serves as a vehicle for increasing this output. In 1983, the total contribution of the public and private agriculture sector to the total GNP (Z$5081 million) was Z$592 million (Kadhani 1986, 115).

TABLE 8

ZIMBABWE PESTICIDE USE (ESTIMATED)

(1,000 lbs active ingredients)

CROP	FARM TYPE		
	LSCF	SCCF	CFA
Corn	30,000	1,500	2,000
Cotton	1,384	503	106
Groundnuts	192	2	102
Tobacco	55	1	1
Total	31,631	2,006	2,209

Total Sum = 35,846,000 lbs of active ingredients

Source: Compiled and estimated by Dr. George Bird.

The pesticides used in Zimbabwe to increase yields and the national agricultural output are extremely toxic and use of these is often strictly controlled in developed countries. In Zimbabwe, cotton, tobacco[11], and groundnuts[12] are major export crops which use the most United States "restricted use pesticides".

The "restricted use pesticide" classification in the United States is legally enforced and carries liability (civil and criminal penalties) for failure to comply. Products established by the EPA as "restricted use" bear such notification on the product's label and require applicator certification before they can be purchased. This certification exposes applicators to types of protective clothing, a general understanding of toxicity, pesticide classifications, safety/first-aid techniques, container disposal, pest identification, integrated pest management techniques, present United States regulation on pesticides (e.g., Endangered Species Act), and much more. These chemicals are therefore available to the population with the understanding that they will be applied by a "trained" applicator (or supervised by one) who has a general

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[11]Cotton and tobacco use significant amounts of carbamates and organophosphates (see Appendix A for a discussion on the toxicity of these).

[12]Fungicides are used heavily on groundnuts. Frequently, these are diothiocarbamates.

understanding of the dangers these chemicals can pose.

When these "restricted use" chemicals are transferred to Zimbabwe, where such training of applicators does not exist, both the applicators and general population are exposed to a variety of potential hazards. This is where problems arise when core regulated pesticides are exported to the periphery without the same control standards.

Ranking of Pesticide Use By Crop

Of the three main crops produced in Zimbabwe, tobacco and cotton use the most pesticides. Groundnuts are the second heaviest user and maize uses the least of the three.

Ranking of Pesticide Use By Agricultural Subsector:

1 - Large Scale Commercial Farmers use the most pesticides in Zimbabwe. Their use is comparable to that of commercial farmers in Michigan.

2 - Small Scale Commercial Farmers use the second largest quantity of pesticides. They use about 50% less than what large scale commercial farmers use.

3 - Communal farmers use the least amount of pesticides of the three. They use approximately 90% less than what the large scale commercial farmer uses.

Although this thesis skates over the technical aspects of the pesticides used in Zimbabwe, it is important to have a general understanding of what the main chemical groups used are. According to T. Bwititi et al., the most commonly used pesticide groups in Zimbabwe are the organophosphates (e.g., parathion, dimethoate, monocrotophos, dioxanthion, dicrotophos, chlofenvinphos), the oganochlorines (e.g., DDT, endosulfan), and the carbamates (1987, 120). See Appendix A for a more complete discussion of these three pesticide groups.

The Chemical Industry in Zimbabwe

The chemical industry in Zimbabwe, which includes pesticides, stands third in the net output ranking of the manufacturing sector (Ndlela 1986, 153). In 1982, this sector was responsible for producing 13 percent of the total manufacturing gross output. The fertilizer section of the chemical industry comprised 33 percent of the total gross output of the chemical industry.

For the formulation and manufacturing of various crop chemicals, there are four main companies which form an oligopoly. According to Daniel Ndlela, "the only major pesticides not produced in the country are ethylene dibromide (EDB) and methyl bromide", however the implication about the "minor" chemicals being

imported is not clarified (1986, 153). One must understand the toxicity of these two chemicals and how they are regulated in the United States in order to understand the implications of their use in Zimbabwe. This is an example of how the core has double standards. These chemicals are controlled in the United States but are readily exported elsewhere and used there without the same control(s).

Ethylene Dibromide and Methyl Bromide

Ethylene Dibromide is a toxic[8] halogenated fumigant (Insecticide, Nematocide) used in the soil to control nematodes, in post harvest grain to control insects, and in post harvest fruit and vegetables to control fruit flies. In 1984-1985, Zimbabwe produced 936,989 tons of maize which was used for food self-sufficiency and export (Moyo 1986, 176). Maize meal (sadza) makes up the staple diet of most Zimbabweans. Hence, the welfare of maize from harvest to storage is of vital importance because of its export potential to bring in much needed foreign exchange and its ability to make the country

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[8]The oral LD50 for EDB in rats is 108 mg/kg and the dermal LD50 for rats is 300 mg/kg. An LD50 (Lethal Dose) "is used to denote the acute toxicity of a pesticide. It is defined as the average dose in milligrams of a particular pesticide per kilogram live body weight (mg/kg) that is needed to kill 50% of the experimental animals" (International Organization of Consumers Unions 1986, 2).

food secure. Thus EDB is used to secure the welfare of the maize.

In 1981, the United States Environmental Protection Agency (EPA) "cancelled all registrations for products containing EDB except those to be used as described in the cancellation order". Also, as of September 1, 1984, "the cancellation of product for use [EDB] in the quarantine fumigation of fruits and vegetables other than exported citrus and papaya" went into effect (International Organization of Consumers Unions 1986, 63). According to the International Organization of Consumers Unions, six other countries (e.g., India, Philippines) besides the United States have put one form of a restriction or another on EDB. EDB can cause acute health hazards through irritation to the eyes, skin, and mucous membranes, central nervous system depression, and kidney and liver damage. Whether EDB is purple labelled (see discussion of this in Chapter 2, p. 49) in Zimbabwe or not is presently unknown to the author, but discussions with Professor George Bird[9] reveal that it is used as a grain fumigant which, according to him, is extremely dangerous. Access to protective clothing is limited for individuals applying and using such a toxic

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[9]The author has had informal conversations with Professor George Bird who is a professor in the Department of Entomology at Michigan State University and has conducted much research in Zimbabwe with pesticides and specifically with nematodes.

chemical as EDB, increasing the risk of poisoning.

Methyl Bromide is a toxic[10] fungicide, herbicide, insecticide, nematicide, and rodenticide used on agricultural crops, soil, manure, stored commodities, homes, mills, and transportation vehicles. The (US)EPA "is concerned about the acute toxicity risks associated with the use of methyl bromide, it believes that the precautionary labeling measures required..., monitoring to establish safe levels for reentry to enclosed spaces and the addition of chloropicrin to formulations as a warning agent will significantly reduce these risks" (United States Environmental Protection Agency 1988, 510). Methyl Bromide is a restricted pesticide and has restricted-use classifications to protect users from its acute toxic effects.

In the United States, all fumigants require special certification in order to use them. They are considered to be extremely toxic and dangerous, especially when not handled and applied properly.

These examples illustrate that the regulations instituted at the periphery are an inverse response to regulations that occur at the core. Banning pesticides in the core can in certain cases cause them to become readily available at the periphery. Through years of

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[10]Methyl Bromide has an oral LD50 in rats of 214 mg/kg.

exposure and use in the United States these chemicals have proven to need to be strictly regulated, yet they are used in Zimbabwe with weaker controls[11].

Pesticide Regulations in Zimbabwe

The regulating board is located in the capital of Zimbabwe, Harare. The office is housed in the "Pesticide Registration" and "Plant Import Permits" building (see Figure 3). According to Dr. Bird, the office, regulating for the whole country, is run only by two individuals; a stark contrast to the regulating board, EPA, of the United States.

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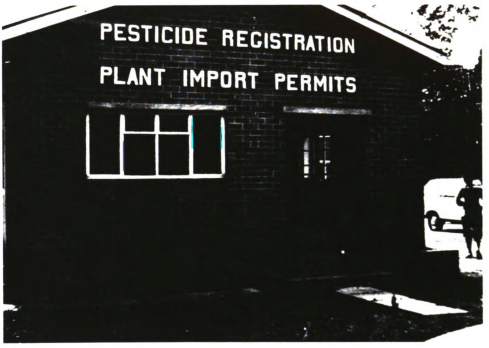
[11]Methyl Bromide and Ethylene Dibromide are needed in Zimbabwe for preventing the growth and development of aflatoxins in stored grain. Consequently, the economic benefits out weigh their toxicity and potential dangers.

FIGURE 3

ZIMBABWE'S PESTICIDE REGISTRATION BUILDING IN HARARE



This office's central concern is not with testing toxicity levels of chemicals which cause pesticide poisoning by humans. Instead, the primary focus is on testing chemical materials for efficacy. Apparently, too many companies are selling chemicals in the name of effectiveness, when they actually do not work at all. Therefore, the Pesticide Registration office is mostly concerned with ensuring that chemicals released onto the market work. If a chemical passes an efficacy test, registration is granted. The government accepts the

chemicals once they pass their efficacy test and they also accept the information on the chemical's toxicity that the chemical companies must provide with the chemical. The toxicity reports for each chemical, found on its Material Safety Data Sheet (MSDS), have usually been composed outside Zimbabwe (in the core), indicating that the results may be irrelevant for Zimbabwe's climate and soil conditions. For example, in the United States, pesticide applicators are cautioned about transporting pesticides in the trunk of their car on a hot day, since the consistency of the substance may be altered (see footnote 1). Also, often farmers and laborers do not have access to the protective clothing detailed on the MSDS, which is needed for use with a given chemical. For example, on the MSDS for Methyl Bromide, measures are indicated for protection of eyes, respiration, the head, feet, and body/skin/hand. For foot protection, the MSDS states that rubber or leather gloves are not to be used, because they readily absorb Methyl Bromide. Instead plastic or canvas covered with plastic gloves are to be used. The plastic must be tested to indicate that it cannot be permeated by Methyl Bromide. The MSDS states that the greatest danger in handling Methyl Bromide, as far as skin/body/hand are concerned, results from absorption or entrapment from the chemical in or under gloves or clothing, including

rings, watch bands, bandaids, etc. How many farmers and laborers in Zimbabwe have access to plastic tested gloves or are even aware of the potential hazards involved with application of Methyl Bromide?

In order for these core imported chemicals to work effectively in the periphery, without long term detrimental effects, extensive testing needs to be conducted. Zimbabwe must first establish whether these pesticides will work in the soil and climatic conditions without changing their molecular structure and consequently their effectiveness. After such tests are conducted, Zimbabwe needs to establish a system by which highly toxic chemicals from core countries might be used safely by a populace without adequate protective clothing and without an extensive extension service to educate farmers and laborers on how to apply, handle and dispose of such toxic chemicals.

Zimbabwe has made an attempt to control the pesticides imported into Zimbabwe that are restricted or banned in the United States by applying a purple triangle to their labels. This purple triangle is supposed to indicate that this chemical is the most dangerous of all chemicals permitted in Zimbabwe and that it is not permitted for use by communal farmers. Yet, how many farmers (and laborers) are aware of this labelling system? How many can accurately identify the

level of toxicity associated with each triangle? How many know how to handle and apply the pesticide with its coded triangle?

CHAPTER III

ECONOMIC AND POLITICAL CONSTRAINTS, AND POLITICAL IMPLICATIONS IN REGULATING PESTICIDES IN ZIMBABWE

As has been outlined in Chapter I, domestic regulations in the periphery are influenced both by regulations in the core and by the economic and political consequences of the unequal exchange that takes place between the core and the periphery.

Economic and Political Constraints

The control of Malaria and Trypanosomiasis (carried by tsetse flies) is vital in Zimbabwe for preserving human health, tourism, and the exportation of beef to the European Economic Community (EEC). The two latter factors are important for economic flexibility, especially in the area of foreign exchange much needed to purchase foreign inputs (e.g., pesticides, machinery, capital intensive goods). The use of DDT can be seen as one means of increasing economic stability in Zimbabwe.

Since its 1982 partial ban (see Chapter I, p. 15), DDT is used in Zimbabwe solely for the control of malaria mosquitoes and tsetse flies. DDT is very cheap to produce, does not eat up so much of the precious foreign exchange and continues to be used because of its cost effectiveness (see discussion on Figure 1).

According to Mpofu, "to date there is no suitable alternative insecticide to DDT for ground spraying in tsetse control", but there are alternatives in aerial spraying (1987, 33). There are alternative insecticides to control malaria, but these alternatives can not compete with DDT in terms of cost.

> Most organophosphates, synthetic pyrethroids and carbamates currently available would cost 3-4 times as much to procure as compared to DDT. On top of that, most of these alternatives have a residual life span of, at most, 3 months compared with up to 12 months for DDT. This means that more than one annual spray cycle would be required with the alternative insecticides to achieve the same level of vector control as is currently achieved using DDT. The cost of financing and adequately administering/supervising such a programme on a national scale could be prohibitive and no doubt most national economies have become less supportive of such malaria control programmes (Mpofu 1987, 33).

Even though there are controversies over the health hazards involved with DDT, the Zimbabwean government continues to use DDT with a "restricted use ban"[12]. By regulating DDT for specific use only, the government has in effect "regulated" DDT to satisfy environmentalists, but has adhered to its use for economic reasons (see Figure 1).

A lot of money, time, and effort has gone into studying the health hazards of DDT in Zimbabwe. The

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[12]The "restricted use ban" on DDT limits its use to governmental project control of malaria, through the spraying of huts, and control of trypanosomiasis, and through aerial and ground spraying of designated areas. Individual consumer use is prohibited.

government wants to continue use of DDT, especially with the present tsetse eradication scheme taking place in the Zambezi valley and therefore has put money into such research. The government has a vested interest in the above scheme. In order to maintain political credibility they must provide for the resettlement of the land hungry peasantry who voted them into power. If the Zambezi valley is released from the grip of the tsetse fly, millions of acres will become available for resettlement of displaced individuals in an attempt to restructure the previous unequal land distribution (a main component of the socialist government's agenda). This land could be used for the harvesting of cash crops such as cotton and range cattle to earn precious foreign exchange. Since the government has a vested interest in presenting DDT in a favorable light, government sponsored research needs to be assessed with this in mind.

The government needs to justify the "restricted use" of DDT in Zimbabwe and from their point of view, it appears that the cost effectiveness of this product outweighs the potential health and environmental hazards. Though legislation on the use of DDT was tightened in 1982, before this date DDT was applied to cotton and other crops, including food products, during

the rainy season when runoff was the highest[13]. According to Mpofu, a researcher for one of the government's research laboratories, "there is every justification for the continued use of DDT in Zimbabwe for the time-being" (1987, 34).

Presently in Zimbabwe (1988) a five-year study is being conducted to "evaluate the health hazards of agrochemicals" currently used in Zimbabwe. The study is being funded by the Swedish Agency for Research and Co-operation and is being implemented by Dr. Charles Nhachi, a toxicologist in the Godfrey Huggins School of Medicine's clinical pharmacology department, in co-operation with the Department of Community Medicine ("Swedish-funded Study Looks At Pesticide Hazards", April 29, 1988). Reviewed in the government newspaper the "Zimbabwean Farming Gazette", the study in its first two years has apparently found that most cases of poisoning by pesticides were a result of "failure to wear protective clothing, misuse, and carelessness" and that fatalities were due to "suicide" (ibid). In a country where people often do not wear shoes in every day life and where monies for protective clothing are

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[13]Zimbabwe's spraying season still takes place during the rainy season. The implication of this for surface and groundwater contamination is great. This issue merits further research to probe what alternatives (if any) can be implemented to reduce such contamination from occurring.

practically non-existent, the researchers' comment citing one cause of poisonings as the "failure to wear protective clothing" is a naive assessment of local conditions. It is also hard to believe that the fatalities were solely due to "suicide", since there is so much carelessness in regard to pesticide use and limited research on pesticide poisonings, especially in the long term.

The article also mentions that there is much need to use hazardous pesticides in Zimbabwe. One could claim that this need to use hazardous pesticides is a response to the desire to obtain foreign currency as a considerable proportion of Zimbabwe's Gross National Product arises from the agricultural sector. There is therefore a link between government vested interests in obtaining foreign exchange and the relatively lax regulations on pesticides that exist in Zimbabwe. This relates directly to Figure 1.

Political Implications in Regulating Pesticides

Perrow (see Chapter I, p. 23) has pointed out that the real issue in risk assessment is political and economic power. One of the primary objectives of the Zimbabwean government is to be seen to be fulfilling the promises made to the people of Zimbabwe during the liberation war. These promises include enhancing the

African population's well-being through redistribution of land, wealth, education opportunities, health facilities, job opportunities and enhancing the productivity of the rural areas where the majority of the electorate live.

This thesis argues that the Zimbabwean government, as the prime mover in setting domestic regulations, does so within the constraints set by its relations with the core and complicated by its own socialist policies. The economy is dominated by the private sector, which is protected by the government in the hope that the money accrued from this sector will finance long-term structural changes to the economy to bring about a more equitable distribution of resources following stated Marxist-Leninist principles.

It is in the government's best interest to be seen to be redressing the imbalance between the productivity of the large-scale commercial farmers (producing cash crops for export) and the communal farmers. An important component of successful cash cropping is the input of pesticides. Since productivity is a central objective in government policy and since pesticides have been shown as increasing productivity, the government tends to view the use of pesticides in a more favorable light than they would if productivity for cash crops and the accruing of foreign exchange was not a major

concern. An out right ban of DDT in Zimbabwe would mean a decrease in productivity (e.g., a reduction of beef exportation to the EEC).

An illustration of the above point has been discussed in Chapter II, p. 43 in regard to the chemicals Ethylene Dibromide and Methyl Bromide. These chemicals play a vital role in the long-term storage of Zimbabwean produced grain. The government has to assure that the Zimbabwean population will always have ample access to maize, its staple diet. The political implication of the government not fulfilling this obligation has been exemplified in Malawi and Zambia where food riots occurred when these governments could not provide their populations with sufficient supply of maize at a reasonable price.

As has been mentioned, these chemicals have severe restrictions on their use in the United States and are considered to be highly toxic. Their use is closely monitored so as to prevent poisoning. Since the Zimbabwean government sees the successful storage of maize as the primary issue, the toxicity of the pesticides used for this becomes a secondary issue. Of course, there are also important economic implications, but the government realizes that its many and various irrigation schemes in the Lowveld and cotton schemes in the Zambezi valley or maize productivity in the rural

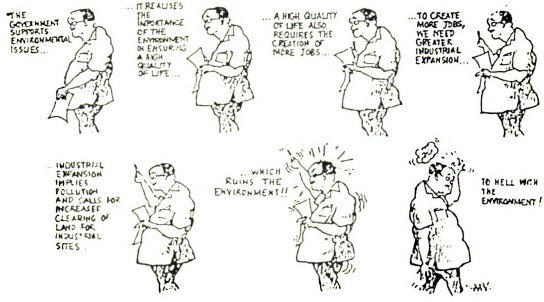
areas would not be feasible without pesticides. The government must be seen to be fulfilling its promises of redistributing wealth and encouraging productivity in the rural areas, otherwise they might find themselves without jobs. For Zimbabwe, the freedom of choice whether to important active ingredients from the core or not, is highly constrained by economic and political issues.

As has been outlined earlier, the commercial farming sector plays a crucial role in earning foreign exchange and providing consumables for the domestic market. "The Ministry of Labour's statistics on occupational injury for January-October 1986 indicate 42 cases of acute poisoning by pesticides" have taken place on commercial farms, but Bwititi et al. state that, this "can only be seen as the tip of the iceberg" (1987, 121).

In the latter's study on "Health Hazards in Organophosphate Use among Farm Workers in the Large-scale Farming Sector", their findings indicate that the there is a low-level of compliance to the Hazardous Substances and Articles Act of 1978 which includes legislation on protective clothing (Bwititi et al. 1987, 125). They also emphasize the inadequate conditions of the disposal of containers and claim that there is a need for greater enforcement of existing legislation. In regard to the analysis of pesticide poisonings in

terms of the core and periphery, it can be seen here that substantial poisoning cases exist despite clearly stated legislation to protect against this. If one deprived large-scale commercial farmers of toxic chemicals or increased enforcement of legislation, this would inhibit productivity. As has been stated, the government favors productivity and though legislation may exist to safeguard the health of workers, in effect the blind eye of the government is often turned.

FIGURE 4



Source: The Zimbabwe Science News, Vol. 21, Nos. 5/6, May/June 1987.

CHAPTER IV

CONCLUSION

An important aspect of pesticide regulations is that they are portrayed as being a governmental means of control in protecting human beings and the environment from pesticide's inherent toxicity. Inter alia, Zimbabwe institutes regulations for pesticides to achieve such control, yet the effectiveness of these have been questioned and challenged in this thesis. The argument of this thesis has been centered around the nature and effectiveness of Zimbabwe's domestic regulations and their relationship to regulations in the core. This thesis by no means presented this issue in its entirety. Yet, the proposed model (Figure 1) and the examples used provide the reader with an insight to appreciate the complexity of the issue. In answering whether Zimbabwe's regulations are effective in preventing pesticide poisoning by its populace, one has to reply conditionally in the negative because there is an inherent structural problem prohibiting effective control. The issue at hand is that Zimbabwe's pesticide regulations are mostly concerned with insuring the efficacy of the product which translates into increased crop yield, increased exportation, and increased foreign exchange. The toxicity of the product as a hazard to

human health is an ancillary issue.

If Zimbabwe's pesticide regulations are to effectively prevent pesticide poisoning of its populace then Zimbabwe needs to reassess its line on the purpose of regulations. There is a need to institute pesticide regulations as a component of a complete package of pesticide management which might include:

- research on product efficacy and toxicity;
- more research and support for alternatives to hazardous pesticides;
- educational programs and materials on interpretation of regulations (e.g., understanding the triangle system);
- monitoring the environment for pesticide contamination; and
- control of container disposal both by the chemical companies and by applicators.

If Zimbabwe were to institute such a regulatory package one has to question what effect this would have on the economy and national policy. Given the core/periphery relationship that has been outlined in this thesis, it would appear to be in Zimbabwe's best interest to develop regulations that do not merely respond to the economic constraints which characterize this relationship.

This thesis has raised many questions which should

be used as a spring board to analyze the micro-issues resulting from the structural problems that have been outlined. This micro-analysis could reveal changes which can be made within Zimbabwe to challenge and change its present structural problems resulting from its dependency on the core.

Dependency theorists differ on solutions for breaking this structural problem. Theorists from the political "right" emphasize independence, while those from the "left" emphasize revolution(s). But these two solutions may not present a realistic answer. Some of the alternatives to challenge the structural dependency of Zimbabwe could warrant analysis at a micro-level.

There is a need to investigate and understand what types of problems Zimbabwe's present pesticide regulatory structure poses for communal farmers. There is a need for research projects to find out what the farmers decision-making process is when using pesticides. Where do farmers get their pesticides? How do they identify the problem with their crop and which pesticides do they use to treat it? What pesticides are available to communal farmers? What "awareness" do farmers have about a) pesticide hazards to humans, b) alternatives to pesticides, c) environmental degradation, and d) precautionary measures when dealing with pesticides?

Although the use of pesticides is of economic interest in the short term, the long term potential for health hazards and environmental degradation cannot be ignored. Perhaps the time has come for Zimbabwe to implement a pesticide management package as part of its rural development initiatives.

APPENDIX

APPENDIX A

ORGANOPHOSPHATES, ORGANOCHLORINES, AND CARBAMATES

Organophosphates are frequently used as insecticides. During World War II, the Germans discovered the organophosphates in an attempt to find potent human nerve gases. These are nerve gases for both mammals and insects. Flint and Van den Bosch have stated, that "in general, compared to the chlorinated hydrocarbons, the organophosphates are much more toxic in low doses to insects, people, and other animals and kill a much wider variety of animals, but are less persistent in the environment" (1981, 164). The organophosphates interfere with the transmission of cholinesterase.

> Cholinesterase is an important enzyme that "turns off" individual impulses after they have been transmitted across a nerve-to-muscle connection. If the action of cholinesterase is inhibited, the impulse remains on and the circuit is effectively jammed - keeping the muscle twitching and making it impossible for further messages to get through (Flint and Van den Bosch 1981, 164).

Organochlorines are also found in the form of insecticides. Their mode of action is to interfere with the nerves transition of messages in target organisms (pests) and non-target organisms (humans). In the United States, according to the International Organization of Consumers Unions, "many [organochlorines] have been withdrawn or their

agricultural uses severely restricted due to their persistence in the environment, damage to endangered species, or potential to cause chronic health problems, reproductive system damage, and cancer. Some organochlorines are also very persistent in human fat tissues" (1986, 155).

Carbamates, similar to organophosphates, interfere with cholinesterase activity. These are found in the form of insecticides, carbamates, and although revealing similar symptoms of organophosphate poisoning, not many carbamate poisonings are life-threatening.

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