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**GEOGRAPHICAL VIEWPOINT****FOOD AND SOCIETY  
THE DRAGON IN THE GARDEN**

by

LARRY N. GARRETT

**INTRODUCTION**

There are causal relationships which exist both throughout the geographic world and cross-culturally between food, the cultural aspects of food production, and societal responses to the use of available foods. These relationships are reflected in such cultural phenomena as those suggested by the title of Marvin Harris' 1975 book *Cows, Pigs, Wars and Witches*. Simplistically stated: "cows and pigs" may be viewed as the economic (trading) network which even in preliterate societies may become quite complex; "wars" may be construed to refer to the inter-tribal and intra-group rivalry conflict and open wars which are often precipitated by the differential accumulation of foodstuffs, shortages, or greed, and, finally; "witches" may be viewed as the religious context in which foods often play a vital role in feasts, religious legends, and the formation of god matrixes. Further, as will be explored in this paper, food is reflected in a given society (or culture group) through that society's technology for food production, acquisition, polity (alliances to prevent war and to promote internal harmony), and internal legal sanctions.

Certainly, food production and the cultural attitudes toward food are important in contemporary industrial societies, and the necessity for increased nutritional inputs<sup>1</sup> continues to be a real need in many societies. However, this paper is confined to the examination of the relationships between food production and accession in several preliterate societies and the resultant impact that food acquisition has on a culture group's entire lifestyle. With certain groups discussed, for example the Bontoc

<sup>1</sup> Especially in developing nations; i.e. see Robinson (1974).

and Woleai groups, the term "preindustrial" is more literally accurate than the term "preliterate." However, this is basically a syntactical, not a substantive, differentiation.

As the cultures briefly examined are quite complex, no one culture or culture group will be examined in depth. The sole purpose of this paper is to illustrate only one facet of a particular group's lifestyle: the relationship between their food (from production to consumption) and their cultural adaptations to food stocks. References are suggested for in-depth analysis of particular groups.

This paper is further limited to the examination of contemporary preliterate cultures or to those of the immediate historical past. Archaeological evidence would allow a similar examination of such groups as the Hopewellians of the Ohio Valley or the various burial mound builders of the Southeastern United States. Nor is this paper oriented to an examination of the technological aspects of agriculture tool use, development and evolution within contemporary cultures. Such a topic is a theme unto itself.

Finally, this paper is organized thematically or topically and not by culture group considered. Arbitrary categorization of the paper into such topics as "Religion" or "Legal sanctions" represents an artificial state of affairs; actually, as will be illustrated, a culture group may resort to religious legal sanctions to insure conformity. However, such departmentalization (as precisely as possible) does offer clarity, unity, and, hopefully, a flow to the paper.

### ECOLOGICAL ADAPTATIONS

Ecology is the science concerned with the interrelationships of things to their environment.<sup>2</sup> Man, and the culture group or society of which he is a part, perceives and interprets his environment (and ecosystem) through the filter of his own way of life or culture.<sup>3</sup> Each individual preliterate culture makes particular responses or adaptations to its natural environment, and these adaptations are often unique and fascinating.

One such specific adaptation is reported by Harry W. Basehart<sup>4</sup> who studied the Bantu-speaking Matengo who occupy the highlands east of the Lake Nyasa escarpment and south of the Ruhuhu River to the Mozambique border vicinity in extreme western Tanzania.

The Matengo cultivate intensively on the steep highland slopes and the method is termed the "pit system." They dig pits which extend from the bottom of the hillsides to within a short distance of the top and subsistence crops are planted on the raised ground surrounding the pits.<sup>5</sup> This system is extremely effective in preventing erosion of the

<sup>2</sup> Dasman (1972:12)

<sup>3</sup> Broek and Weeb (1968:23); see also Tuan (1974).

<sup>4</sup> Basehart (1973).

<sup>5</sup> Basehart (1973:58).

cultivated mountainside, and "the use of the pits in conjunction with green manuring, regular crop rotation, and fallowing insures the maintenance of the fertility of the fields for an indefinite period."<sup>6</sup> In fact, one local agricultural officer reported that certain fields had been farmed for sixty years.

Basehart<sup>7</sup> reports that a division of labor exists among the Matengo pit farmers. Men cut the grass over a proposed pit and save the natural growth for green manure. Women dig the pits using long-handled iron hoes. Pits are approximately 15.50 cm in diameter and deep enough to expose the subsoil in the center. Subsistence crops include maize, beans, cassava, sunflower, and millet for brewing beer.

Another remarkable ecological adaptation is reported by Olga F. Linares.<sup>8</sup> Linares' data is based largely in archeological evidence discovered at Cerro Brujo site, Bocas del Toro Province, NW sector of the Isthmus of Panama. The Province faces the Caribbean Sea or Atlantic Ocean. While the physical evidence is archeologically based, Linares<sup>9</sup> notes that

"as a kind of mammalian 'tending pattern', garden hunting may have taken the place of animal domestication in parts of the New World tropics. Both patterns result in the substitution of culturally created for naturally existing mammalian biomass. Even now, after the introduction of barnyard animals and cash crops, garden hunting remains a widespread practice."

Linares<sup>10</sup> continues:

"The new terrestrial hunting adaptation that was devised and is represented at Cerro Brujo is what I have called 'garden hunting' because in all likelihood it took place in and near cultivated fields and house gardens. In this dual system, animal protein and carbohydrates are spatially concentrated and their abundance *vis a vis* each other is regulated. By reducing seasonality and scheduling problems, garden hunting was analogous to, and may have even substituted for, actual animal domestication. . . . The most abundant animals present are either smallish animals that live in the underbrush or recently cleared fields (the caviomorph rodent and armadillo), or larger forms that are not too shy and live — or can live — in forest-edge conditions (the collared peccary and the white-tailed deer)."

The garden-hunting techniques of Linares are extremely interesting. Generally, one thinks of preliterate groups as belonging to such types of subsistence as hunting-gathering,<sup>11</sup> sedentary farmers, fishing, or some basic or traditional combination of these or more complex patterns.<sup>12</sup> However, in Linares' example the animals come to the hunters.

<sup>6</sup> Basehart (1973:58).

<sup>7</sup> Basehart 1973).

<sup>8</sup> Linares (1976).

<sup>9</sup> Linares (1976:332).

<sup>10</sup> Linares (1976:344-5).

<sup>11</sup> See Service (1966).

<sup>12</sup> For example see Oswalt (1972).

## POPULATION

Once a particular group has made an adequate ecological response (and, as noted, responses are extremely diverse and dependent upon many variables), several interrelated factors come into play. Paula Brown and Aaron Podolefsky,<sup>13</sup> for example examine the relationships between population density, agricultural intensity, and land tenure. Their article (based in the New Guinea Highlands) is complex and extremely quantitative in design, but quite succinct. They note<sup>14</sup> that

“population growth stimulates expansion, migration, and intensifying agricultural practices. These make more land available for agriculture, and increase food production in the locality, which will support a larger population. This intricate interrelation of land, population, and agricultural technology takes many forms, with an overall high positive correlation.”

## IDEOLOGY/RELIGION

While a group's food production and food base are reflected in such natural variables as population density, settlement patterns, land tenure, and agricultural intensification, food is also reflected in a group's ideology.

Pablo Filog<sup>15</sup> reports on one such ideological custom, the *Tengao*. Filog is a native of the Philippine Bontoc area of which he writes. Bontoc is one of the towns lying along the Chico River of central Northern Luzon. Like other towns and villages of the Bontoc group, the town is situated on the slopes of the Cordillera Mountains.

*Tengao* is a custom performed by the mountain-dwelling Bontoc group in relation to agriculture, climate, and sickness. *Tengao* has two meanings, a broad one and a narrow one. In the former it means “stay at home” for whatever reason (to weave, baby-sit, *et al.*), but “in the strict sense, *tengao* means a rest day because it is sacred.”<sup>16</sup> It is made sacred by a religious performance, and to work in the fields on *tengao* is taboo.

There are a tremendous number of *tengaos* associated with the agricultural cycle which starts at *chinamey* (cold season). Filog discusses, in considerable detail, fifteen such *tengaos*, plus three associated with the climate and two more dealing with sickness.

A strict *tengao* or rest day is declared the evening before by the boys (although they do not decide *when* to call). In the early morning of *tengao* the boys divide ranks and post themselves at all the paths leading to the *ili* or village. No one can now enter or leave the village, and anyone caught by the boys is fined. This fine may be a pig, rice, chicken, or firewood. Generally, rice and firewood are collected and these are taken to the *ato* of the men responsible for the implementation

<sup>13</sup> Brown and Podolefsky (1976); see also Harner (1970).

<sup>14</sup> Brown and Podolefsky (1976:229).

<sup>15</sup> Filog (1977).

<sup>16</sup> Filog (1977:39).

of the observance of the strict *tengao*. These men arrange to have the fines exchanged for pigs and chickens (so much rice = 1 pig, and so on) and they make the arrangements with someone willing to make the trade.

"The chickens or pigs are used as victims in the sacrifice at sacred grove (*papatayan*). If it is the *ato's* turn to give its contribution for the *papatayan*, then the fowl or hog is taken on the day itself. Otherwise, the one who agreed to have the rice and firewood must be ready to produce the needed victim when that time comes."<sup>17</sup>

A *tengao* does not require watchers: at 9:00 AM no *tengao* men and boys in charge may go around to each house in the *ili* searching for violators. While small children are excluded, "those liable to be fined if they are not at home are the parents, elder children, and grandparents." Filog continues that "if one member of the family is not at home *tengao* enforcers get five bundles of rice (one *iting*) or a bundle of firewood."<sup>18</sup>

As noted, *tengao* is partly religious in orientation, but there are also social and economic parameters. In fact,

"*tengao*, by its very definition, implies that it is a social function. Its performance and observance are dictated by custom and tradition. The old men who are knowledgeable about the custom and tradition decide on what kind of *tengao* is to be observed, when and how it is to be observed (and, as noted, it is declared by the boys), and who performs the sacrifice. They also decide on the obligation of the people towards the *tengao* holders."<sup>19</sup>

Filog lists another purpose of the *tengao*: ". . . their observance is healthy since people need rest. Some celebrations of the *tengao* give opportunity for them to enjoy the fruits of their labor not only with their families but also with their relatives and neighbors."<sup>20</sup>

And, as noted, the *tengao* has religious overtones. As well as social, it is religious in nature. The Bontoc believe that when one dies his soul (*leng-ag*) lives on and this *leng-ag* joins the spirits of its ancestors who dwell in the nearby mountains. Further, the *leng-ag* have their own rice fields and animals and it is not uncommon for them to return to their village "to mingle with people." Filog thus illustrates that

"The Bontoc view the world of powers and spirits as part of their natural world. No wonder then that whatever they raise, be it crops, pigs, chickens, or carabaos, and whatever they do or say to raise them are influenced by and directed towards the powers and spirits. One of their activities which reminds them of their religious obligations is the *tengao*. The day is made sacred by the sacrificial act. It binds the people to abstain from field work and to keep the day sacred."<sup>21</sup>

<sup>17</sup> Filog (1977:40); the sacrifice is minutely described on 44-5.

<sup>18</sup> Filog (1977:40).

<sup>19</sup> Filog (1977:58).

<sup>20</sup> Filog (1977:58).

<sup>21</sup> Filog (1977:63-4).



Filog's article is complex, extremely detailed, and thoroughly fascinating. He concludes:

"The Bontocs through so many generations have created a system by which they relate themselves to the material world, the social world, and the spiritual world. By observing the customs which affect these three different aspects of life, they keep themselves in harmony within their existential world."<sup>22</sup>

Religion, majic, and food often intermingle in preliferate societies. William H. Alkire<sup>23</sup> reports that "...on certain specified occasions ... crop majic is (or at least was, until very recent times) practice on many of the Caroline Islands of Micronesia." The specific area of Alkire's study is Woleai, an atoll of the Western Caroline Islands located about 640 km SE of Yap, and about 800 km W of Truk. Crop majic is common on Woleai after a typhoon, when the crops of breadfruit, coconut, and taro are doing poorly, and during the *galigi* ceremony which is performed upon a porpoise catch.

There is, on Woleai, a "typical" division of labor based on sex. The men fish (including canoe fishing), and climb the coconut and breadfruit trees,<sup>24</sup> while women work the taro fields. At times, such as before a feast, sexually mixed groups gather food. Still, the men do not work the fields but may help gather and transport the vast amounts of taro required. Likewise, women may help pull fishing nets ashore on the lagoon, but they do not enter the canoes.

Alkire notes that one group of men may, if they desire, work the taro fields. These are the *Limarchbwut* (part women), "...men who 'walk and talk like women.'"

"... In western culture," the author continues, "(*Limarchbwut*) would probably be categorized as male homosexuals. Informants stated that it was well known that taro tended by a *limarchbwut* grows faster and better than that cared for by the women. The classification of these individuals supports rather than contradicts the general rules governing the sexual division of labor."<sup>25</sup>

Like the Ulithi whom Lessa<sup>26</sup> considers, the Woleai group have a body of folklore. The porpoise (*gu*) has entered Woleai folklore and the *gu* tattoo is "... one of the most popular in the Western Caroline Islands."<sup>27</sup> Alkire reports that the last Woleai *gu* catch was in 1953 and he adds that "there is some evidence that porpoise hunting was of greater importance in the Carolines in the past."<sup>28</sup> However, he notes

<sup>22</sup> Filog (1977:66).

<sup>23</sup> Alkire (1968:280).

<sup>24</sup> See Lessa (1966:13).

<sup>25</sup> Alkire (1968:282).

<sup>26</sup> See especially Chapters #5 and #6; Lessa (1966:49-76).

<sup>27</sup> Alkire (1968:284).

<sup>28</sup> Alkire (1968:286).

that porpoise are still sighted in the area frequently, and that the lack of hunting is probably due to a manpower shortage. There was depopulation after outside contact and many able-bodied men now work on Ulithi or Yap and/or attend school there.

Alkire describes a "traditional" *gu* hunt, the taboos surrounding it, and its social parameters, and he concludes:

"The function of the *galigi* in Woleai society . . . might be interpreted . . . as one means of dissipating the tensions which are generated by the prohibitions built into the social system . . . The analysis of its functions . . . can be carried a step further and stated positively, for the *galigi* provides an opportunity for the unity and solidarity of the community to be actively and symbolically affirmed — an affirmation which is needed because of the diverse effects of the day-to-day sexual restrictions. . . . The porpoise catch is a time for 'male' majic for the benefit of a 'female' product, and it is initiated when a female sexual symbol (the porpoise) is taken by the men from their domain (the sea). Hence the association of porpoises and taro."<sup>29</sup>

Food takes on other sexual connotations and symbolism, especially in initiation rites. T.O. Beidelman<sup>30</sup> offers one example of such a rite. Beidelman worked in Kaguruland, east-central Tanganyika, 1957-1958 and again in 1962-1963. The author has also worked with the Ngulu who live near the Kaguru and who share many of their cultural features.

Beidelman's 1964 report concerns the *Guluwe*, a Ngulu female initiation rite involving a "mock" hunter and his wife and those to be initiated plus one attendant for each initiate. The author wrote the following report on *Guluwe*:

"The two women (initiates) bearing seeds place them in the grass; they lie down, and with their arms behind their backs, crawl along on their bellies to retrieve the seeds with their mouths. The two women then stand and transmit the seeds by their mouths into the hands of the hunter and wife."<sup>31</sup>

The ceremony of the wild pig (called *Guluwe*) is extremely complex (involving kinship groups, role differentiation, instructive sexual songs), but its intent is clear: the initiation of Ngulu girls into womanhood. And, again, food plays a primary role.

## WAR AND PEACE

Food has often played an important role in war, mock war,<sup>32</sup> and alliance formation and maintenance among preliterate groups.

<sup>29</sup> Alkire (1968:288).

<sup>30</sup> Beidelman (1964).

<sup>31</sup> Beidelman (1964:367).

<sup>32</sup> For example see Batay-An (1977).

Marvin Harris<sup>33</sup> quotes Roy Rappaport's *Pigs for the Ancestors: Ritual in the Ecology of a New Guinea People* and notes that certain New Guinea subgroups or clans hold a *kaiko* about every twelve years. This *kaiko* is a festival composed of preparations, small sacrifices, and a "massive" pig slaughter. Such a festival lasts about one year and is followed by armed combat. With additional sacrifices during war, each clan is soon bereft of pigs and the fighting stops. During the intervening peace, there is a ritual planting, on a sacred spot, of the small *rumbin* plant.

Harris writes:

"By a detailed study of one clan called the Tsembaga, Rappaport has been able to show that the entire cycle — which consists of *kaiko*, followed by warfare, the planting of *rumbin*, truce, the raising of a new pig herd, the uprooting of *rumbin* (which occurs only when enough pigs have been raised to have a mighty *kaiko* to 'thank the ancestors properly'), and new *kaiko* — is no mere psychodrama of pig farmers gone berserk. Every part of this cycle is integrated within a complex, self-regulating ecosystem, that effectively adjusts the size, and distribution of the Tsembaga's human and animal population to conform to available resources and production opportunities."<sup>34</sup>

Paula Brown,<sup>35</sup> who completed field research among the New Guinea Highland Chimbu on several visits between 1960-1971, also noted relationships between human and pig populations and warfare. She notes:

"Normal family — human and pig — food needs are affected by its participation in the periodic large feasts. Such pressures, fluctuating as they do over long periods of time, may well have effects upon the systems of land tenure and agricultural practices. They may force a more intensive form of agriculture, and new techniques of cultivation. In this way, the everyday satisfying of personal needs, for food and other product and the cycles of agriculture and animal husbandry lead to social and cultural change."<sup>36</sup>

In Table 1 (next page) Brown lists several causes of war among the Chimbu.

As noted, food — pigs and vegetables — account for 5 of the 14 intertribal causes of war; 3 of the intratribal between-clan causes, and all 5 intraclan causes for a total of 13 of 23 causes of war, or 56% of all causes.

<sup>33</sup> Harris (1975).

<sup>34</sup> Harris (1975:48); see also Garrett (1974).

<sup>35</sup> Brown (1972).

<sup>36</sup> Brown (1972:22).

TABLE 1. SOME CAUSES OF WARFARE IN CHIMBU

	INTER- TRIBAL	INTER- TRIBAL BETWEEN CLANS	INTRA- CLAN	TOTAL
Pork theft	2	3	3	8
Pork debt, inadequate repayment	3			3
Theft of valuables	1			1
Theft of vegetable food			2	2
Divorce	4			4
Courtship rivalry	1			1
Jealousy — husband suspected wife	1			1
Killing of young person	2			2
Death-sorcery accusation		1		1
<b>TOTAL</b>	<b>14</b>	<b>4</b>	<b>5</b>	<b>23</b>

SOURCE: Brown, Paula. *The Chimbu; A Study of Change in The New Guinea Highlands*. Cambridge, Mass.: Schenkman Publishing Company, Inc., 1972. (Used by permission of publisher.)

Food, however, may be an agent for peace as well as a causal factor in war. Jens Bjerr<sup>37</sup> illustrates how food may serve as a tool of alliance. Bjerr studied the Bushmen of Southwest Africa (Namibia) and worked in the area of the Skeleton Coast, the Namib Desert and the Kalahari Desert. He lived with the Bushmen and experienced firsthand their daily lifestyles.

In discussing the Okavangoe peoples of extreme NE Namibia he writes:

"They grow a little maize, tend a few cattle, and fish in the river with spears or large baskets and traps. Many of the Okavangoes have a traditional arrangement with the Bushmen who lived further inland by which the Bushmen bring them wild fruits, roots, berries, nuts, and in exchange they take a share of the maize harvest . . . The old feuds between the two races (cultures) seems to be forgotten."<sup>38</sup>

#### LEGAL SANCTIONS

Some space has been devoted to legal sanctions in the section on Ideology and religion in which Pablo Filog's tengao studies were analyzed. However, further elaboration illustrates the tenet that food may (both directly and indirectly) serve as both the *means* for establishing legal sanctions and the *end* for satisfying those sanctions once established.

<sup>37</sup> Bjerr (Banister, translator) (1960).

<sup>38</sup> Bjerr (1960-79); see also Service (1966:5 and 100-103).

This principle is illustrated in the work of Albert S. Bacdayan.<sup>39</sup> Like Filog, Bacdayan is a Filipino and a native of the area about which he writes. The group which Bacdayan considers is the Tanowong, a Bontoc group of the Mountain Province, northern Luzon, the Philippines.

Rice is the staple food, and terraced rice production is the primary agricultural technique of the Tanowong. There are four distinct Tanowong villages, and the rice terraces are mostly near Tanowong and Kadatayan, the two oldest villages. Generally, the terraces lie about 3 km north and south of these two nodes. While there are small springs in the area, they are too small to provide the significant amounts of water required to flood the terraces. Therefore, water has been acquired, for a long time, from two streams near the summit of the mountain on whose eastern side the fields are located. Irrigation is required.

Bacdayan reports:

"Because of a history of an egalitarian exploitative pattern of their territory, and an equally long history of village endogamy which is now breaking down, all the rice fields in this area are traditionally owned by Tanowong people. More importantly, all families in Tanowong own at least one rice field in the area. Given the tremendous effort needed to construct and maintain the irrigation ditches and the dams at the water source which divert the water, and given the fact that everyone in Tanowong is involved because everyone owns terraces, irrigation among the Tanowong is a serious communal affair."<sup>40</sup>

The primary irrigation ditch is about 4 km long and is on the average about 12 cm wide and 14 cm deep. The ditch requires maintenance and once a year, in late December, there is a major repair effort. Both men and women of all ages work, and it is often hard labor, especially if typhoon damage is severe. If there is major damage, stone retaining walls may have to be re-built and the project may require several days to complete. More routine maintenance, also communal, generally requires one day to complete.

As noted, both men and women generally participate in ditch maintenance, and jobs include: 1) cutting side growth, 2) removing earth or stone blockage, 3) plugging leaks, 4) repairing retaining walls, 5) building and installing wooden flumes, 6) building new foot bridges, and 7) repairing dams.

All this maintenance, and any major re-work, is begun (and perhaps ended) on one day late in December. After the work, the working groups (especially the men) split into smaller parties and go to each

<sup>39</sup> Bacdayan (1974).

<sup>40</sup> Bacdayan (1974:249).

Tanowong village to collect fines from those who did not help. These sanctions, then, grow out of the need to communally provide for the food base of the entire group. And while money (one peso) is suitable fine payment, food is often employed as payment. Five bundles of rice or a good drink and meal *for the group* is also adequate payment.

Once the water is flowing, 8-12 water distributors work to portion the water fairly. This job is a vital one, and "in neighboring areas where there are no water distributors, suspicion and 24-hour vigilance is standard practice, punctuated with not infrequent altercations and even violence at the height of the dry season."<sup>41</sup> The job is difficult: distributors rise early and are at work by 5:30 AM. They channel the water through cuts onto the terrace. After a morning work shift they return home and complete their work there, then return at about 5:30 PM to the ditch where they work until after dark. No woman has ever served as distributor. Headmen of a village suggest a distributor, or a man may volunteer and, if trusted, be allowed to attempt the job. Of course, there is considerable prestige afforded the successful distributor.

There have been some changes in this system since 1972 when the Philippine Government supported the Bwasao irrigation project. The social organization and traditional patterns have been enlarged. "I propose," Bacdayan writes, "that . . . irrigation expansion served to reinforce traditional Tanowong social organization and to integrate their contemporary relationships with other villages at the same time that it enhanced the articulation of the relatively isolated Tanowong community with the outside world, in particular with the structure of the Philippine national state."<sup>42</sup>

### PERSONALITY DEVELOPMENT

Dorothy N. Shack<sup>43</sup> quotes A. Richards' *Hunger and Work in a Savage Tribe*: "for men food acquires a series of values other than those which hunger provides." Shack continues that "the expression and transmission of these values should be manifest in the way people are fed, and the uses, other than nutritional, to which food is put." Shack has studied the Gurage, a people of the "sparsely fertile semi-mountainous region of Southwest Ethiopia."

The staple food of the Gurage is the *ensete edulis* (*asat*) or "false banana plant," and each household produces an abundance of it.

"*Ensete* is the primary source of food. The massive root (*wahta*) of the mature harvested plant, as well as the pseudo-

<sup>41</sup> Bacdayan (1974:250).

<sup>42</sup> Bacdayan (1974:247).

<sup>43</sup> Shack (1969:292).

stem, is decorticated ("peeled") to extract the edible food substance, which is then buried in deep pits and allowed to ferment."<sup>44</sup>

Besides food, there are utilitarian uses for *Ensete*: (1) a stem fibre is marketed for cash, (2) the pliable fronds make an almost water-tight bundle to cover foods/personal items, (3) food is served on "plates" shaped from small pieces of the frond on ceremonial occasions, and (4) in case of fire, owners of nearby huts cover their thatch roofs with green moist *Ensete* fronds.

Shack offers a comprehensive analysis of the feeding habits of the Gurage from birth to adulthood. The eating behavior of the group's members change as individuals mature and pass through such stages as marriage. "There are obvious sex differences in the feeding of children. Customarily brothers are always fed before their sisters and supposedly in greater quantity; sisters are required to serve their brothers at every meal and also to prepare food for them when necessary."<sup>45</sup>

Starvation and famine are unknown to the Gurage, and large amounts of *Ensete* are stored in pits. However.

"not only are children underfed, but Gurage cultural habits lead to the development of anxiety over nutrition which is manifested in institutionalized attitudes and behavior toward food. The use of *Ensete* in curing patients believed to be possessed by evil spirits is to be noted in this regard."<sup>46</sup>

Shack lists and briefly discusses several "general personality characteristics" of the Gurage which are related to the nutritional system: (1) selfishness, (2) emotional detachment, (3) unrelatedness, (4) passivity ("Both verbal and nonverbal behavior suggests defenselessness in an environment that is envisaged as hostile"<sup>47</sup>), (5) dependency (even "affluent" Gurage expect gifts from those seen as more fortunate although they may have rendered *no* service or exchange for an expected gift), and (6) feelings of worthlessness.

Shack's work clearly shows, among the Gurage, the significant relationship between food/nutritional practices and personality development.

### CONCLUSION

Food is truly the dragon in the garden. Among the preliterate groups reviewed it has been demonstrated to contain the stuff of magic, religion, initiation, legal sanctions, war and peace, and even personality development. Food often determines the nature of a group's ecological adaptation; is related to their hunting and gathering patterns; to their economy and trade; to the division of labor (and the many customs relative to that division); and to the policy of a group. And food often helps provide social cement for a group's internal social organization.

<sup>44</sup> Shack (1969:292).

<sup>45</sup> Shack (1969:296).

<sup>46</sup> Shack (1969:296).

<sup>47</sup> Shack (1969:298).

This paper has examined many of these relationships: the ecological adaptations of the Mantengo; the Bontoc's *tengao*, social organization, and legal sanctions; Woleai majic; war among the Chimbu and peace among the Bushmen; and Gurage personality development.

While this paper has been limited to an examination of certain pre-literate group's adjustment to foods (and the lack of it), nutritional intake, food production/technology, and the cultural expression of food in society, the dragon is not extinct in industrial society. Indeed, each culture, regardless of degree of stratification or development, must each day face the dragon in the garden.

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# DEVELOPING CONCEPTUAL UNDERSTANDING IN GEOGRAPHY

by

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The literature in geographical education has been characterized in the last decade by an increasing emphasis on ways of developing pupils, understanding of fundamental concepts used in geography. In this paper I intend to:

1. investigate the nature of concepts;
2. summarize some of the research on the learning of concepts which may assist you in selecting content and skills in geography for varying age and ability levels; and
3. suggest some approaches to developing an understanding through skills.

## WHAT IS A CONCEPT?

Before we can discuss this topic we must decide what we mean by the term 'concept'. The nature of concepts and the learning of concepts have been of interest to philosophers, psychologists, and educators for some time, and this interest increased significantly in the 1950s when Bruner emphasized the importance of teaching through the structure of a subject which required the development of a framework of concepts that gave cohesion to the subject.<sup>2</sup>

Even the most cursory examination of the literature reveals that there is a wealth of material available on concepts and conceptual development, and as is so frequently the case in education and psychology there are many definitions of the term *concept*.<sup>3</sup> We have to make a

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<sup>2</sup> J. S. Bruner, *The Process of Education*, Vintage Books, 1960, p. 31.

<sup>3</sup> D. P. Ausubel, 'A Cognitive Structure View of Word and Concept Meaning' in *Readings in the Psychology of Cognition*, R. C. Anderson and D. P. Ausubel (eds.), Holt, Rinehart and Winston, 1965;

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subjective decision about the kind of definition which would be most useful to us in our teaching of geography. I have found that Figure 1, which is modified from a model developed by Abler, *et al* in their book on *Spatial Organisation*,<sup>4</sup> has clarified many terms for me.

Concepts are meanings or understandings organized in an individual's mind as the result of sensory perceptions of external objects or events, and the cognitive interpretation of the perceived data.<sup>5</sup> In order to communicate these meanings, *symbols* are required and are usually in the form of *words*. Teachers soon learn that their pupils often use words that they do not understand, and that they frequently have difficulty expressing their ideas either verbally or in written form (see Fig. 2).

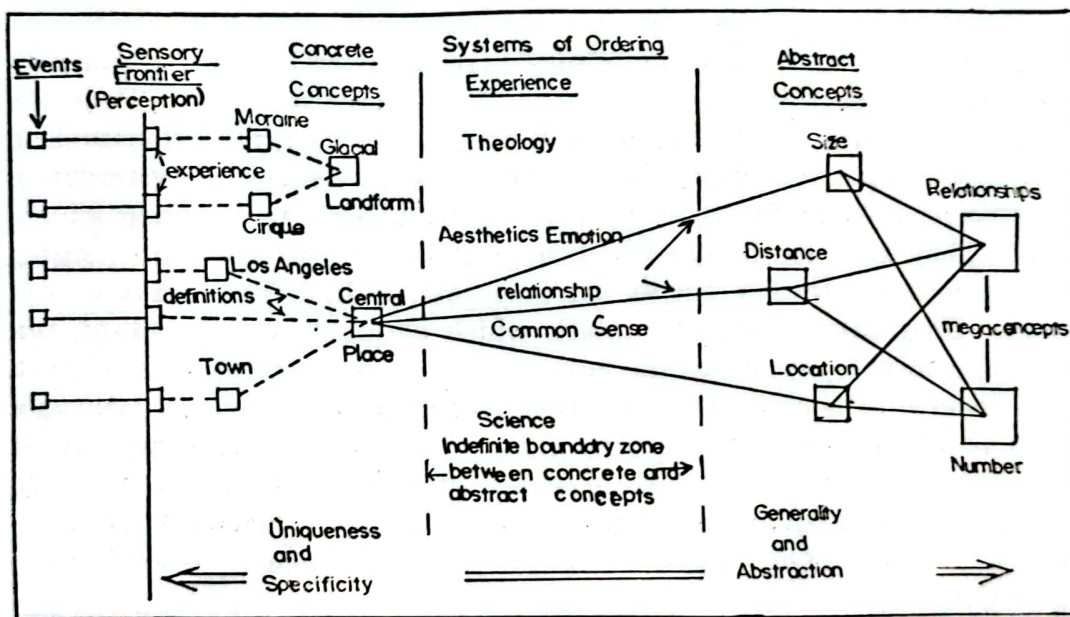


FIG. 1. IMPOSING ORDER ON EXPERIENCE MODEL.

*Research on Concept Development.* — A good deal of research has been carried out, mainly in the laboratory, to try and find out how children acquire or develop concepts, and what factors or variables affect the acquisition of the concept. In the laboratory the studies have frequently taken the form of examining the variables that affect the learning of geometric shapes or nonsense syllables. Clark indicates that the concepts studies are almost exclusively physical objects that display discrete and finite dimensions, and that the critical dimensions of the con-

<sup>4</sup> Ronald Abler, John S. Adams and Peter Gould, *Spatial Organization: The Geographers View of the World*, Prentice-Hall, 1971, p. 31.

<sup>5</sup> A. D. Woodruff, 'The Use of Concepts in Teaching and Learning', *Journal of Teacher Education*, Vol. 15, No. 1, March 1964, p. 84.

**Fig. 2. DEFINITIONS IN GEOGRAPHICAL EDUCATION**

**EVENTS** are things which happen; they are conditions, processes, or objects which exist internally or externally for one or more human beings.

**EXPERIENCES** are our perception of events. Awareness of an event is an experience, and each person passes his or her existence in an *experience continuum*. The experience continuum comprises our perceptions of events in the world and within ourselves. As conscious and self-conscious beings, we must concern ourselves with events in our environment and events within us as well as with the relationships between the two.

**PERCEPTS** are sensory experiences of events. They are often defined as the sensations (sight, smell, sound) received from an object.

**CONCEPTS** are meanings or understandings organized in an individual's mind as the result of sensory perception of external objects or events and the cognitive interpretation of the perceived data. They are generalized bodies of attributes associated with the symbol for a class of things, events, or ideas. They are ways of organizing experience. *Concrete or substantive concepts* are the first steps in ordering experience. They refer to things which are relatively concrete and specific; *abstract or organizing concepts* are ideas generalized from many experiences. They are abstract meanings which assist us to understand the concrete concepts by providing structures for our experiences. There is an indefinite boundary zone between concrete and abstract concepts which is sometimes referred to as *higher order concepts*. Examples of the increase in the complexity of meaning of concepts are a moraine and a cirque-glacial-landforms-*spatial association* of glacial landforms-glaciated regions; Los Angeles — cities — central places — spatial organization.

**FACTS** are singular propositions or items of verifiable information. For example, the farm house has a red roof or the farm has five paddocks.

**GENERALIZATIONS** (include laws, principles and rules) are statements of relationships between or among concepts. An example of a generalization is that variations in the level of economic development affect the interplay of the physical, biological and sociocultural variables on a farm.

**MODELS** are simplified structurings of reality which present supposedly significant features or relationships in a generalized form. *Normative models* are based on the assumption that man is an optimizer; normative decision models are not expected to indicate how men actually behave but how they should behave if they wish to obtain certain defined objectives. *Satisficer models* are based on the assumption that many people make decisions to reach a threshold level of satisfaction rather than a goal of maximization.

cepts used are absolute, whilst in the classroom the concepts become increasingly abstract or verbal, the dimensions are continuous and vary with any number of values, and the critical dimensions and values may change over time.<sup>6</sup>

One of the most common ways of examining concrete or substantive concepts in the classroom is to test the pupil's understanding of the words used, and to require them to present a verbal definition of the terms. Whether this is an adequate test of the acquisition or understanding of the concept is debatable but it is the device used frequently by teachers.

Milburn's study of pupil's understanding of words used in geography revealed, among other things, that:

'... many very basic terms are still imperfectly understood in the early years of secondary school,'<sup>7</sup>

and

'... though there was a marked increase in verbal fluency as the tests progressed through the secondary school, it did not follow that such an increase correlated with the development of concepts'.<sup>8</sup>

In South Australia in 1973 Ozols replicated Milburn's study with pupils in 1st, 2nd and 3rd year classes.<sup>9</sup> He collected a list of 40 terms found in geography texts and reference books used in junior secondary classes, and prepared a test which required pupils to demonstrate their understanding of the terms used by writing a short answer, drawing a labelled diagram or both. Pupils were directed to:

'Try to explain what you think the term means .....'<sup>10</sup>

Some of the results are revealing. For example, the mean for acceptable answers in all first year classes was 12/40, second year 19/40, and third year 23/40. That is, even by third year, pupils were only able to give an acceptable meaning for just over 50% of terms commonly used in textbooks, reference books, and in the classroom. Terms which presented the greatest difficulty included *climate* which was equated with *weather*; *environment*; *latitude* and *longitude*; *precipitation*; *soil*; and *pollution*.

Among the conclusions drawn from this study are:

1. 'For terms such as latitude and longitude pupils revealed a lack of understanding of the idea of imaginary lines being drawn on a globe or map to locate places'.
2. '..... where meanings differ, the child sticks to the most common

<sup>6</sup> Clark, *op. cit.*, pp. 254-255;

<sup>7</sup> D. Milburn, 'Children's Vocabulary' in Graves, *op. cit.*, p. 117.

<sup>8</sup> *loc. cit.*

<sup>9</sup> I. M. Ozols, *Terminology in Geography: A Study of the Understanding of Geographical Terms in Several Junior Secondary Classes in South Australia*, Advanced Diploma Thesis, Adelaide College of Advanced Education, 1973. In South Australia 1st, 2nd and 3rd year classes are the same as NSW years 8 to 10.

<sup>10</sup> *ibid.*, p. 52.

meaning. Thus the homonyms, such as *fault*, were defined as 'a mistake', *legend* as 'an old story', and *weather* as 'to withstand and come through safely'.

3. 'Frequently used terms such as *environment*, *pollution*, and *urban* were quite poorly defined indicating a vague understanding of the terms'.<sup>11</sup>

The significance of these types of findings for teachers is obvious and one cannot but stress the importance of clarity and precision when using language and terminology in the development of concepts, for as Stones comments: 'language enables us to create categories of things, facilitates the formation of concepts, and through language we create concepts which would not otherwise exist'.<sup>12</sup>

Another important feature to be considered in concept development is the pupil's perception of his or her environment. Peel has shown that both learning experiences and maturation enhance the development of each pupil's perception.<sup>13</sup> It is important, therefore, for the teacher to provide those sorts of experiences, that will enhance the child's perception of his environment (see Fig. 3) and thus aid the development of concepts. The importance of fieldwork in teaching geography becomes obvious at this point.

Research into pupils' perception of secondary sources of information is well documented and should be considered by teachers when planning classroom experiences. For example the research of Bartz, Rushdoony and Sandford into pupils' perception of maps, and Long into pupils' understanding of pictures show that there is a need for carefully structured teaching, and recurrent practice in the use of secondary resource material, if pupils are to use this type of material effectively.<sup>14</sup> Much of the work in this area indicates that without careful instruction and practice much of the information portrayed on a map, or in a photograph, is missed or not perceived by pupils.

Insights into the more sophisticated level of conceptualization required for an understanding of *abstract concepts*, such as location, distance, direction, scale, time have been provided by a number of research workers but the work done by Piaget and Inhelder, Bruner, Ausubel,

<sup>11</sup> *ib'd.*, pp. 47-48.

<sup>12</sup> Stones, *op. cit.*, p. 128.

<sup>13</sup> E. A. Peel 'Experimental Examination of some of Piaget's Schemata concerning Children's Perception and Thinking, and a Discussion of their Educational Significance', *British Journal of Educational Psychology*, Vol. 29, 1959, pp. 89-103.

<sup>14</sup> B. S. Bartz, 'Maps in the Classroom', *Journal of Geography*, Vol. 69, 1970, pp. 18-24.

H. A. Rushdoony, 'A Child's Ability to Read Maps: A summary of Research' *Journal of Geography*, Vol. 67, 1968, pp. 213-222;

idem, 'The Geographer, the Teacher and a Child's Perception of Maps and Mapping', *Journal of Geography*, Vol. 70, 1971, pp. 429-433;

I. L. M. Long, 'Research in Picture Study', *Geography*, Vol. 46, 1961, pp. 322-337.

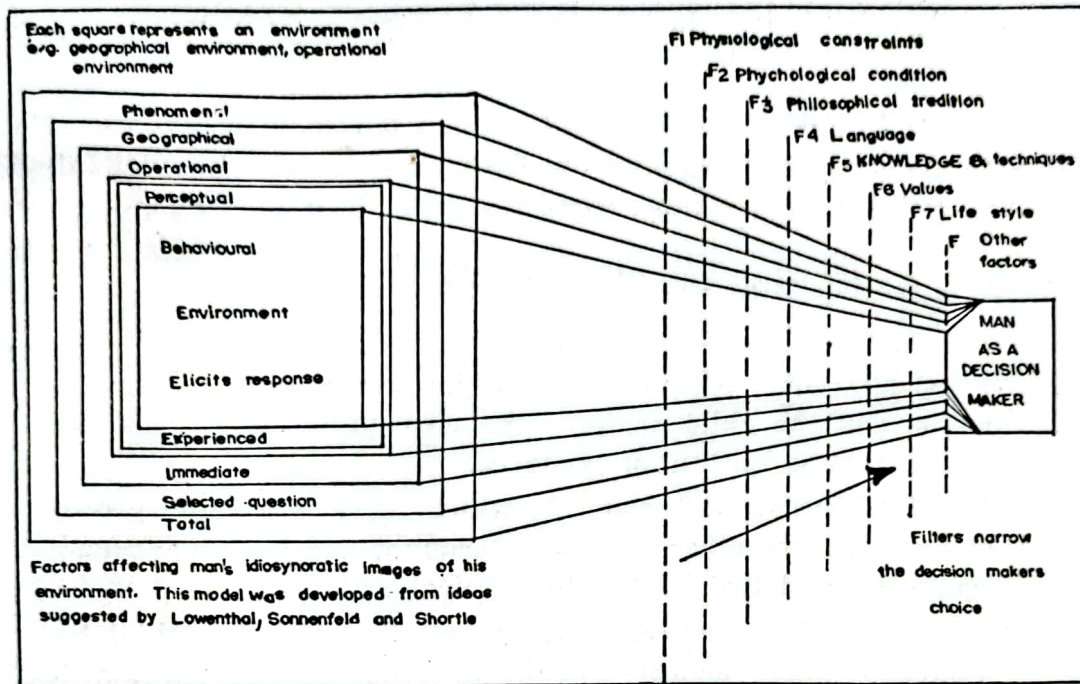


FIG. 3. ENVIRONMENTAL PERCEPTION AND DECISION MAKING.

Gagné, Lovell, Peel, Rhys and Slater are of particular interest to geography teachers.<sup>15</sup>

Most of the studies at the secondary school levels focus on the development of logical thinking having accepted either explicitly or implicitly the Piagetian notion of the period or stage of formal operational thinking manifesting itself sometimes after the age of 11 (see Fig. 4).

Let us now look at some of the implications of these stages of development for geographical education. These generalizations came from a Conference of Teachers in Victoria. It is a consensus of teachers' opinions.

<sup>15</sup> J. Piaget and B. Inhelder, *The Child's Conception of Space*, Routledge, 1966; Bruner, *op. cit.*, pp. 17-54; Ausubel, *op. cit.*; Gagné, *op. cit.*; K. Lovell, 'A Follow up Study of Some Aspects of the Work of Piaget and Inhelder on the Child's Concept on of Space', *British Journal of Educational Psychology*, Vol 29, 1959, pp. 104-117; Peel, *op. cit.*; W. T. Rhys, 'The Development of Logical Thought in the Adolescent with reference to the Teaching of Geography in the Secondary School', M.Ed. Thesis. University of Birmingham, 1966; idem, 'The Development of Logical Thinking' in Graves, *op. cit.*, pp. 93-106; Frances A. Slater, 'Content and Concepts in Geographical Education', in D. S. Biddle and C. E. Deer (ed.), *Reading in Geographical Education*, Vol. 2, 1973 pp. 77-84.

## GENERALIZATIONS ABOUT PIAGET'S STAGES OF DEVELOPMENT<sup>10</sup>

CONCRETE OPERATIONS (8-13 years) in which the child has the ability to apply logical thought to problems concerned with real things he is experiencing or has experienced.

FIG. 4. STAGES OF DEVELOPMENT — Piaget

**SENSORI-MOTOR:** 0-2 years, in which behaviour is primarily motor and the child achieves the concept of object, i.e. that out-of-sight is not out-of-existence.

**PREOPERATIONS:** 2-8 years, in which there is a rapid growth of language and other symbols. Thought and language remain egocentric and tied largely to physical action.

**CONCRETE OPERATIONS:** 8-13 years, in which the child has ability to apply logical thought to problems concerned with real things he is experiencing or has experienced.

**FORMAL OPERATIONS:** From age 13, develops the ability to apply logic to all kinds of problems, including abstract and verbal problems.

It should be noted that age levels are approximations only; it is the *sequence* that is unchangeable.

1. This stage is called *concrete* because the logical thinking of the pupil is limited to his *present, immediate, direct* concrete-empirical experiences of specific places or situations which he can compare and relate to make classifications and simple generalizations.

2. Pupils tend to distrust the subtle, the theoretical or abstract concepts. They are collectors, good at describing in their own words what they see, smell, hear, taste, feel or remember doing.

3. In concrete situations and terms thinking becomes more mobile and flexible. The pupil can edit, select, mentally re-arrange his thoughts on previous experiences as he or she requires.

4. Pupils have an unsystematic and intuitive approach to the solution of problems. In trying to solve a problem that calls for explanation, they operate by *trial-and-error*. They do not set out all the possibilities at the start and then test each one, and they tend to accept the first solution as the only one. Their explanations or hypotheses reflect their own previous real or actual experiences.

<sup>10</sup> Geography Course Rationale Conference Committee, *Geography Course Construction Rationale*, Victorian In-Service Education Publication, Carlton, 1975.

5. This is the period of life's most rapid growth of *information space* (i.e., the areas which the pupil knows something about). It is also the period of maximum interest and tolerance of other, especially different, places and spaces. In specific interests, pupils like what they have learned to like and new interests are *created by teachers* they like.

6. If we take *Map Reading* for pupils 8-13 years of age as an example of a skill to be developed through geography courses:

i) Pupils can read *conventional map symbols* given appropriate experiences, on large scale topographic maps. The sequence of development is:

- a) direct experience of reality-preparing sketch maps in the field using symbols to represent objects;
- b) 3-D models;
- c) pictures or photographs;
- d) semi-pictorial symbols;
- e) conventional symbols.

ii) *Directions on a map* can be understood by most pupils. The development sequence is

- a) *personal* directions (egocentric e.g. in front of me)
- b) *environmental* directions (fixed point system). The pupil thinks of where he is in relation to landmarks and thinks of other places in terms of links between landmarks.
- c) *Cardinal* directions — N, S, E, W.

iii) *Map scale* is understood if a *line scale* is used (particularly if the left-hand end is *not* subdivided). Area scale may not be understood. Verbal scale (one centimetre to five metres is not understood by many pupils, and ratio scale (1:100,000) is too difficult.

iv) *Grid references* may be understood, especially if the mapped area is familiar to the pupil, e.g., a local street directory. The reference system A-4, B-6 is simpler than the conventional six figure system. *Latitude* and *longitude* as concepts are beyond most pupils up to 12 years of age.

v) *Symbols for elevation*, e.g., contours remain difficult until about 13-14 years.

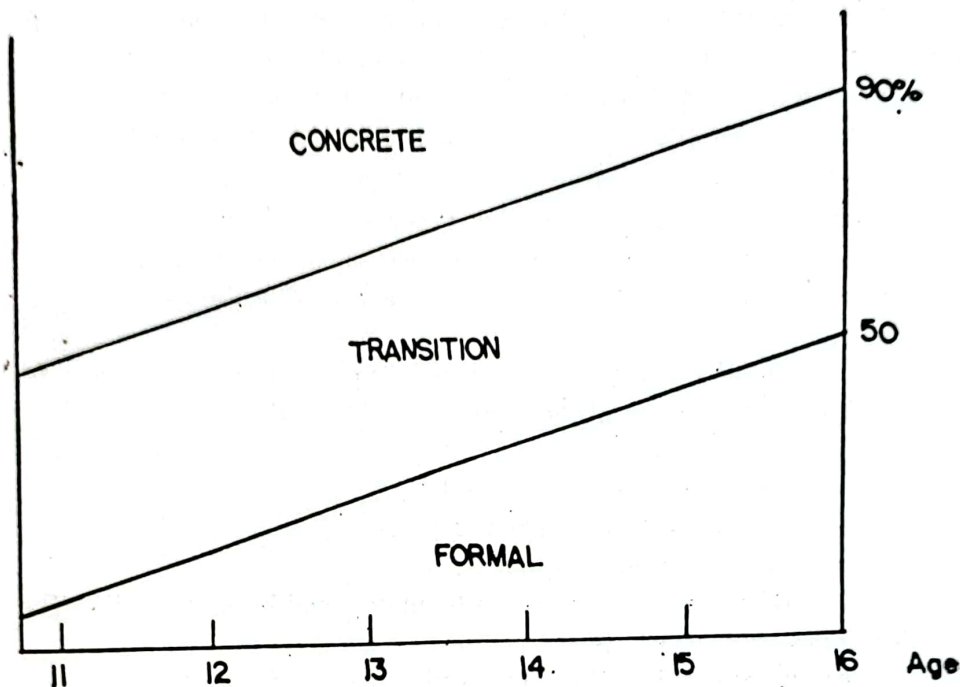
vi) *Map interpretation* is poorly developed. Pupils tend not to bring outside knowledge or evidence to bear on the interpretation of a particular map or photograph.

vii) *Areal classification* (making regions) from air photographs and large scale content maps of areas with which they are familiar are within their capabilities. They can also make simple *spatial generalizations*.

The reason that teachers have difficulties with junior secondary pupils is that pupils vary so much in their intellectual development at this stage (see Fig. 5).



FIG. 5. CONCRETE TO FORMAL OPERATIONS.



Where age levels are indicated these refer to 70% of children not all. At age 13-30% of children will reveal no formal operational behavior.

1. Most pupils are developing from concrete to abstract concepts. However, pupils use of an expanded vocabulary often disguises their lack of understanding of the concepts they are using. Consequently field-work and the use of audio-visual resources are most important aspects in the planning of learning experiences.

2. In solving problems the choice between trial-and-error and systematic problem solving depends mainly on

i) the difficulty of the problem (e.g., number of variables in it, kind of data).

ii) previous learning or experience of the person in the subject and with inquiry methods. From about age 13, pupils tend to bring in knowledge not shown on maps or photos in order to help them interpret such data.

3. Pupils can relate *cause and effect*, at first simply and often in terms of determinism, but gradually they think in terms of probability. For example, they may move from saying that rainfall decides crops grown to saying that it is only one factor. That is, pupils become aware of situations involving the *balance of several factors*.

4. *Short, deductive pieces of work are appropriate*, and pupils become better at forming generalizations and building simple, descriptive models. They begin to search for general principles rather than the generalization of a few cases studied.

5. Pupils are increasingly concerned with what ought to be and not just with what *is*. They are becoming capable of planning ahead.

6. Pupils may have adopted geographical stereotypes of the world. However teachers are able to prevent this happening in many cases by making sure that:

- i) the geography course is inquiry oriented;
  - ii) the pupil's views are discussed, and that he/she is confronted with other views;
  - iii) a balance of area studies is maintained; and
  - iv) similarities between areas are stressed.
- It is thought that four generalizations need reiteration in a variety of contexts in the junior high school, i.e., Years 7-10.
- i) global distributions of various kinds, organic and inorganic, do *not* coincide with political boundaries;
  - ii) similar spatial patterns are found in widely-separated parts of the world;
  - iii) that differences cannot be arranged objectively in order of quality;
  - iv) that people in places widely separated interact with each other.

7. It is difficult to specify more particularly about the development of pupils in this transition, from concrete to formal operations except to emphasize the variability among pupils and for the teacher to be aware of their difficulties.

#### FORMAL OPERATIONS (14 plus Years)

1. The formal operators are able to think about their own thoughts and about propositions or verbal statements. They can do things and know how they did them. They can examine their own thoughts and replace inadequate ideas with better ones.
2. Systematic problem solving is now undertaken. They can accept and make assumptions for the sake of argument, and they can propose a full set of logically possible hypotheses to account for a situation and test each hypothesis systematically. They can think of possibilities unrelated to their own previous direct experiences. The real is now a subset of the possible and they can think *deductively* as with the testing of geographical models.
3. They seek generalizations to explain experience. They have the ability to search for general properties, to state laws, and to make predictions regarding other situations.
4. They can go beyond the tangible, the finite, the familiar to conceive imaginary or ideal situations. They may be concerned with theoretical issues unrelated to everyday realities, and may expect the world to conform to their ideals.
5. Symbols are very important to their thinking and to the development of higher order concepts. They no longer need to refer to concrete examples or specific instances for all their thinking. They can understand symbolic systems and new concepts may be developed through verbal definitions they read or hear.

6. They can handle all kinds of data given appropriate instruction, with *qualitative* techniques preceding the *quantitative*, e.g., describing map distributions verbally before doing so numerically.

7. They can construct accurate maps, employing conventional map techniques and precise measurements.

8. They can operate deductively, taking a geographical model and testing it, evaluating it and possibly improving it.

9. They can plan futuristic cities, and regional development schemes.

10. They are capable of understanding the structure of geography itself.

These are generalizations which a group of teachers developed from their understanding of Piaget's and Cagne's work on concept development and from their practical experiences in the classroom. From the point of view of research, either by educational psychologists or geographical educationists, there does not appear to be much guidance for the geography teacher when he has to make the decision about what concepts are most appropriate for use in the secondary school. However, Hudman investigated how concepts are learned by students and he concluded that:

1. Concepts used by teachers need to be clearly defined;
2. there must be frequent reinforcement of and referral to the concepts being studied or developed;
3. the consideration of the concept at an instructional level must be accompanied by illustration at a practical or real experience level.<sup>17</sup>

#### FUNDAMENTAL CONCEPTS IN GEOGRAPHY

After Bruner appealed to teachers to move away from the selection of content for pupils to memorize, and to concentrate on the identification of fundamental concepts and generalizations which give structure to the discipline, many geographers suggested lists of concepts for organizing or structuring geography curricula. The best known examples in Australia would be those suggested by Greco, Brock and Webb, McCaskill and Blachford (see Fig. 6).<sup>18</sup>

<sup>17</sup> L. E. Hudman, 'Geographic Concepts: A Need to be Explicit', *Journal of Geography*, Vol. 71, December 1972, pp. 520-525.

<sup>18</sup> E. N. Thomas, 'Some Comments about a Structure of Geography' with particular reference to Geographic Facts, Spatial Distribution and Areal Association in C. F. Kohn (ed.), *Selected Classroom Experiences: High School Geography Project*, Geographic Education Series No. 4, 1964, pp. 44-60;

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M. McCaskill, *Patterns on the Land: Basic Concepts in Geography*, Longman Australia, 1973;

Kevin Blachford, *A Geographic Viewpoint*, The Teaching of Geography. Unit 1, Education Department of Victoria, 1971, pp. 54-65;

P. Greco, 'Fundamental Ideas in Geography' in *Concepts and Structure in the New Social Science Curricula*, Irving Morrisett (ed.), Based on a Conference at Purdue University, January 1966, Sponsored by the Social Science Education Consortium, Holt Rinehart and Winston, New York, 1967, pp. 35-37.

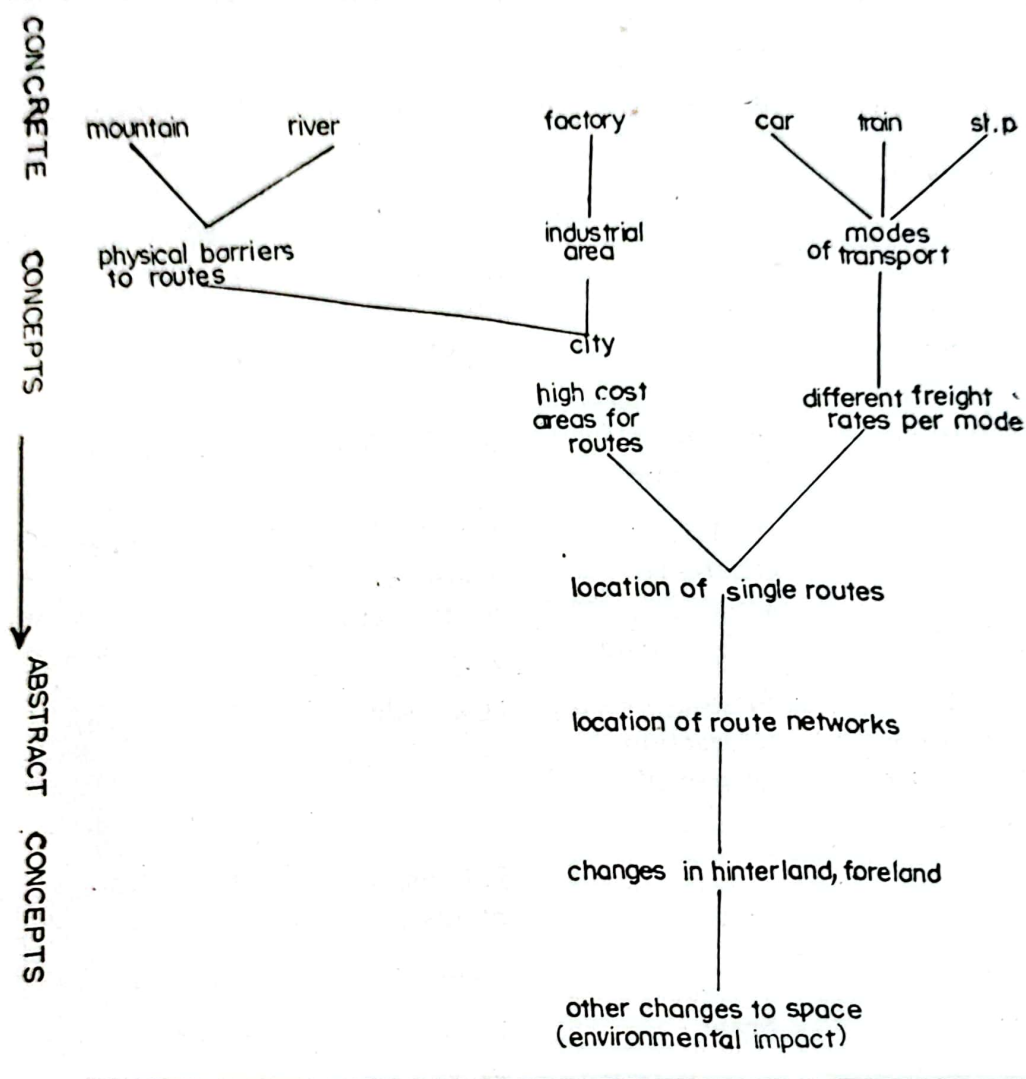
FIG. 6. CONCEPTS IN GEOGRAPHY

<i>GRECO</i>	<i>BROEK &amp; WEBB</i>	<i>BLACHFORD</i>	<i>McCASKILL</i>
Geographic facts			
Location of phenomena in space and time	Location site situation	Location site situation	Location site situation
Geographic distributions	Spatial distribution	Distribution	Distribution
Areal association (formal regions)	Internal coherence (spatial organization)	Association man-land relationships	Association
Spatial interaction (functional regions)	Spatial interaction movement	Interaction	Interaction
—	—	Friction of distance	Distance
—	—	—	Direction
Scale	Scale	Scale	Scale
—	—	Movement	Movement
—	—	Energy	Energy
—	Change	Change	Change
Areal differentiation	Regional concept	Region	Region
			Environmental perception

Blachford suggests that it is possible to identify a hierarchy of concepts when planning a topic. One example developed by teachers at a conference was concerned with the planning of a transport network (see Fig. 7).<sup>10</sup>

<sup>10</sup> Geography Course Rationale Conference Committee, *op. cit.*, p. 3.

FIG. 7. HIERARCHY OF CONCEPTS IN A UNIT ON TRANSPORT.



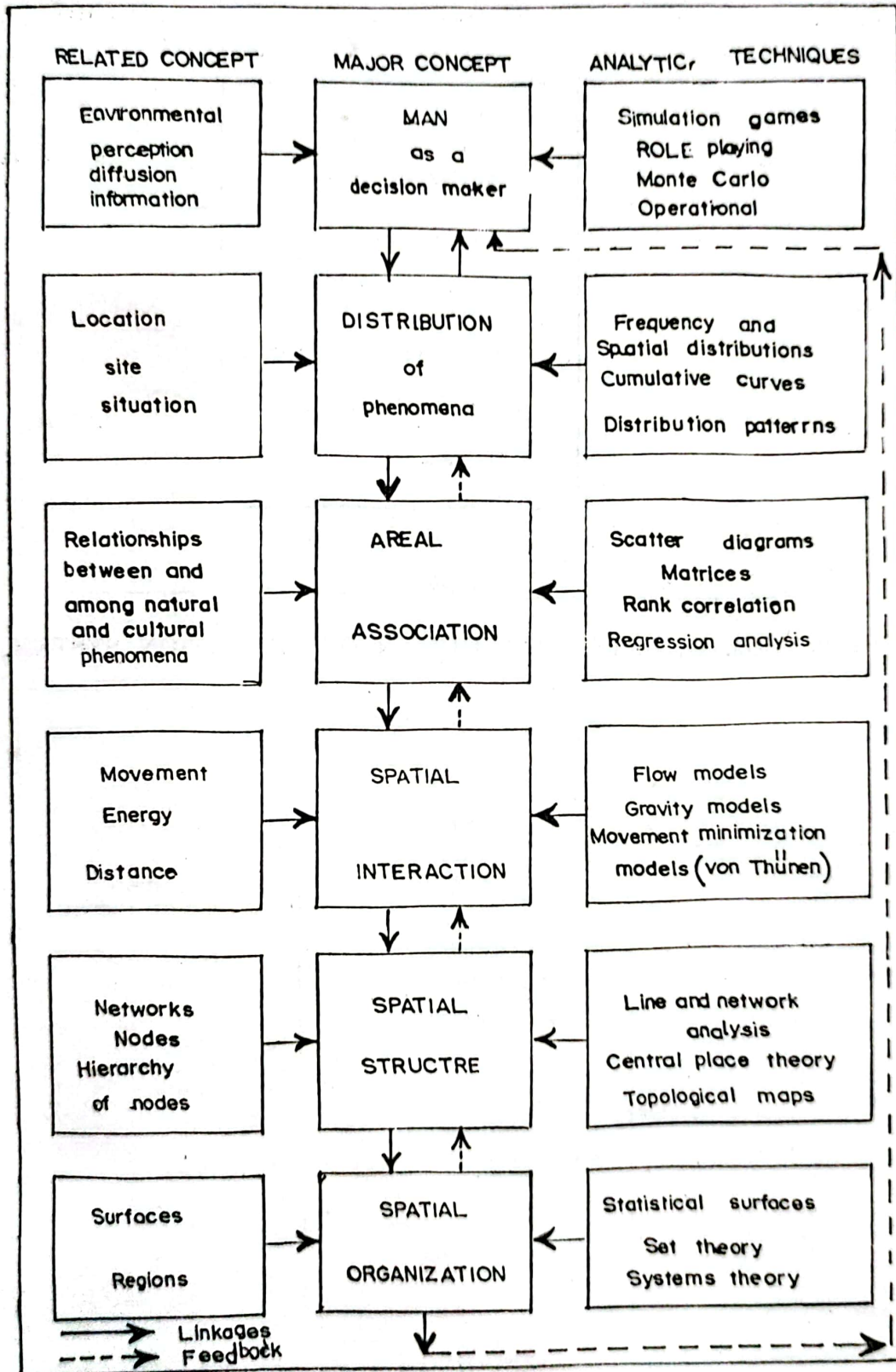
## ORGANIZING CONCEPTS IN GEOGRAPHY

Location, distance, distribution, association, region, movement, interaction, scale, spatial change through time. (Geography Course Rationale Conference Committee, 1975)

Another approach is to identify major concepts, related concepts and types of skills which could be used when analyzing these concepts in relation to reality (see Fig. 8).<sup>20</sup>

In the notes I have given you on seven fundamental concepts used in geography each concept is analyzed and skills to be developed are suggested. I obtained these notes from Teachers' Advisory Notes published as part of the South Australian Geography Curriculum (see Appendix 1.).

<sup>20</sup> D. S. Biddle, *An Investigation into the Use of Curriculum Theory in the Formulation of a Systems Model for Constructing and Evaluating Secondary School Curricula in England and Wales*, Unpublished Ph.D. Thesis, University of London, 1974, p. 403.



(BIDDLE, 1974)

FIG. 8. SPATIAL ORGANIZATION CONCEPT AND ANALYTICAL TECHNIQUES.

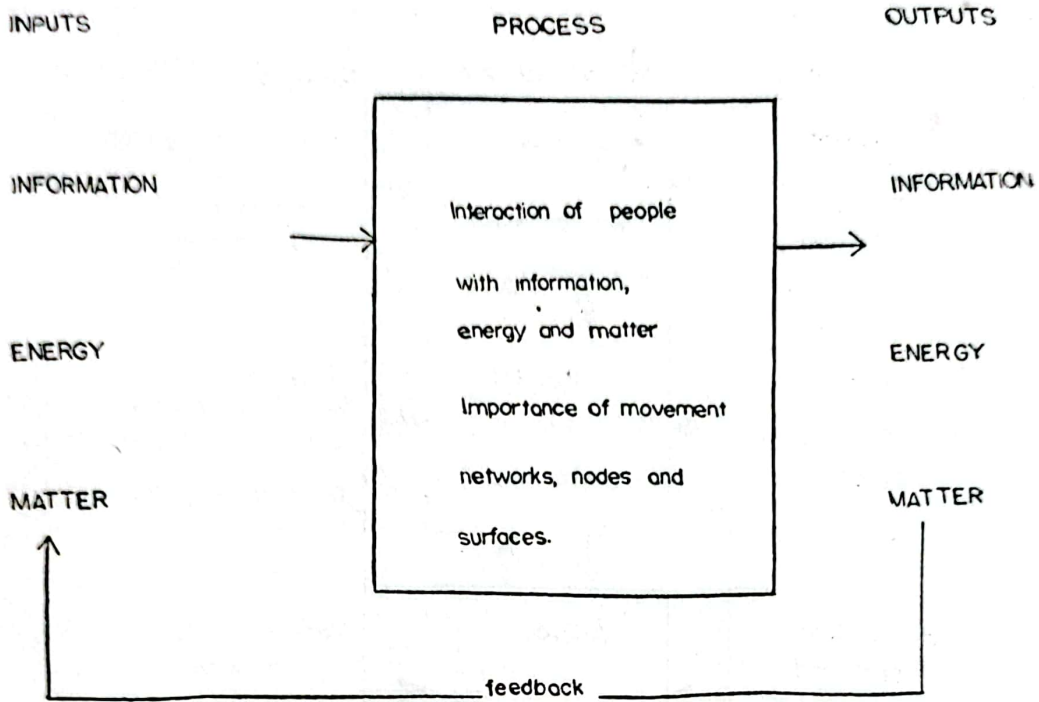
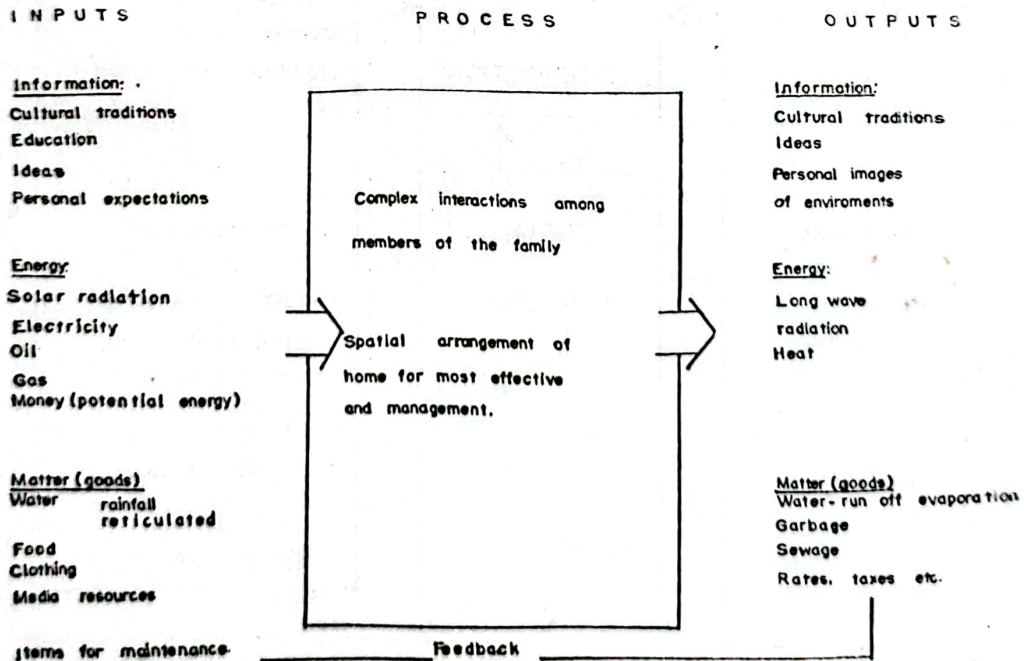


FIG. 9. COMPONENTS OF A HUMAN ORGANIZATION SYSTEM.



(Bidile, 1977)

FIG. 10. A HOUSE BLOCK AS A SPATIAL.

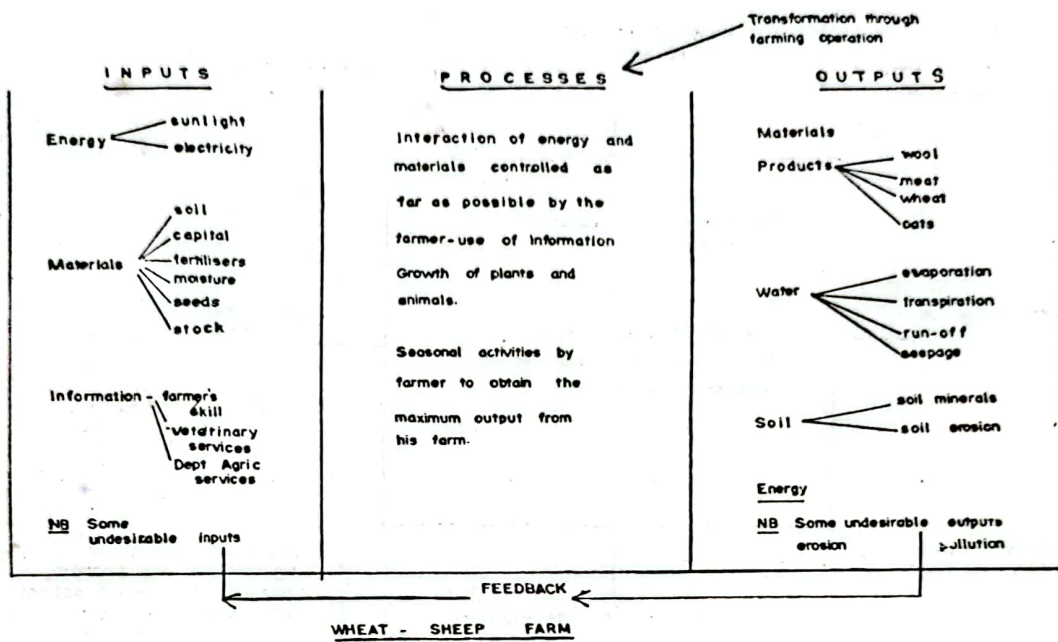
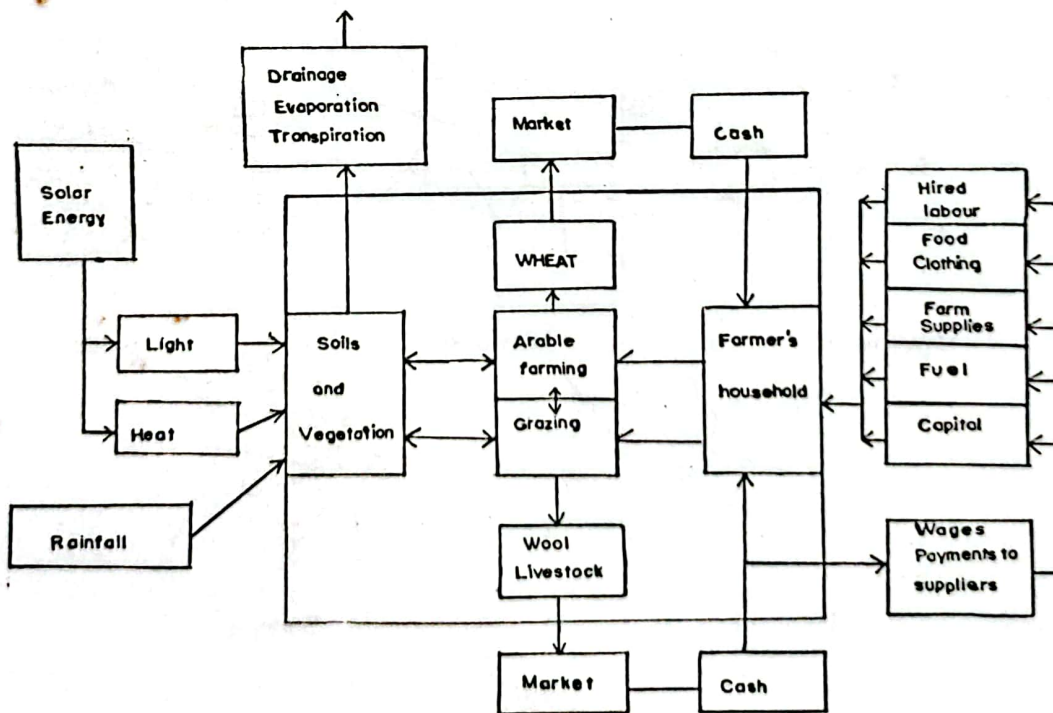


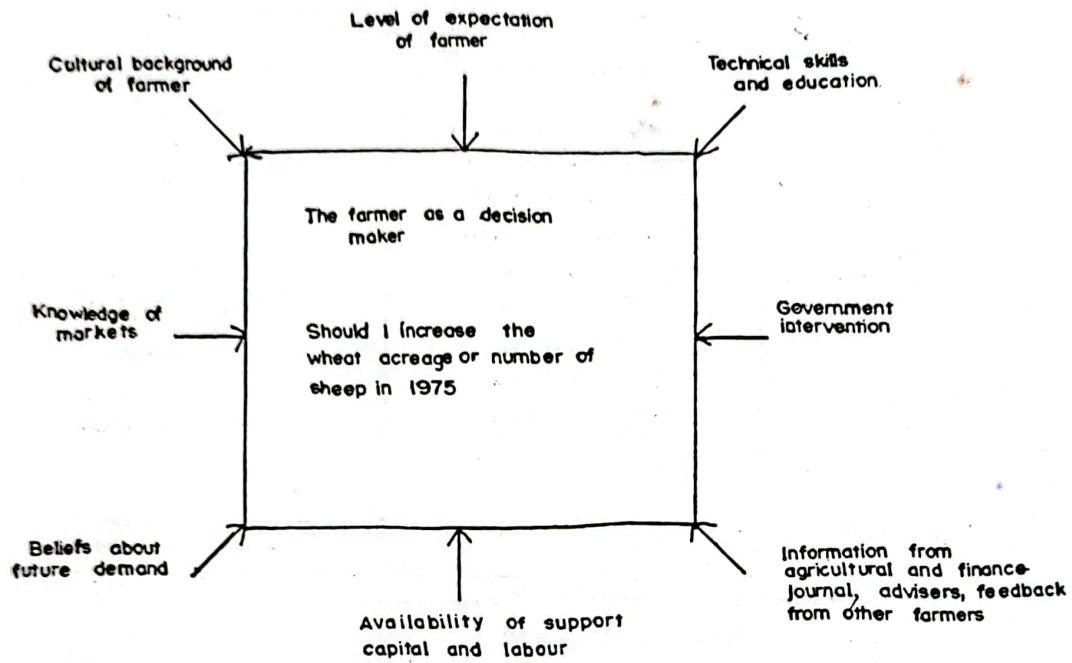
FIG. 11. AN AGRICULTURAL SYSTEM.



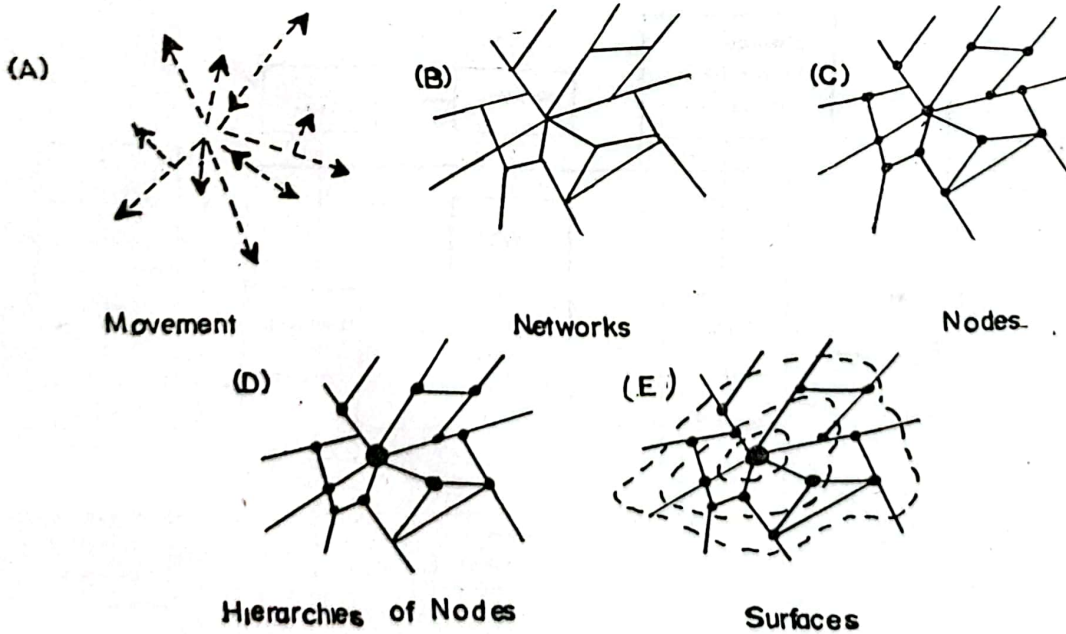
Ref. R Irwin, SYSTEMS IN HUMAN GEOGRAPHY, 1975, page 128

FIG. 12. MODEL OF A MIXED FARMING (WHEAT SHEEP) AGRICULTURAL SYSTEM.





(Biddle, 1977)



Ref. P. Haggett, Locational Analysis in Human Geography

FIG. 15. AN EXAMPLE OF AN INSTRUCTIONAL UNIT

THEME: HUMAN ORGANIZATION SYSTEMS (NSW Geography Syllabus, Years 11 and 12)  
 TOPIC: URBAN SYSTEMS  
 UNIT: ENVIRONMENTAL PRESSURES IN GLADESVILLE AND SYDNEY

OBJECTIVES	Skills	Concepts	Questions or Problems
<b>K1.</b> Identify the main physical characteristics of built environment and describe the purposes they serve;	Formulate hypothesis for each objective then test hypothesis by:	Built environment, Spatial structures, Pollution, Waste disposal	K1. Examine the nature of the built environment in relation to man's need for shelter, transport and environmental control in Sydney.
<b>K2.</b> Describe the natural elements which man endeavours to modify or control;	S1. Consulting resources in library — reports, books, maps, pictures, slides, films;	Spatial association, Environmental pressures, Congestion, Urban sprawl	K1. Contrast skyline profiles and spatial structure of Sydney with other cities.
<b>K3.</b> Analyze problems of pollution in large cities;	S2. Making direct observations when possible;	Urban sprawl, Spatial patterns, Recreational resources, Spatial change.	K1. Discuss implications of spatial structure for commuters in Sydney.
<b>K4.</b> Analyze and evaluate the dynamic aspects of urban centres and the consequent problems of growth and sprawl which increase environmental pressures and contribute to deterioration in the quality of life.	S3. Discussions with authorities such as town planners;		K2. Describe man's endeavours to control natural elements such as surface run-off, streams, banks, high tides and floods, temperature (air conditioning), drought (relate to city water supply) in Sydney.
	S4. Critical review of collected information in class, seminars;		K3. Analyze types of pollution affecting quality of life in Sydney.
	S5. Comparison with other possible hypotheses. Accept or reject hypothesis.		K3. Examine problems associated with waste disposal in Sydney
			K4. Evaluate the consequences of urban growth and sprawl. Suggest future problems and possible solutions for Sydney.

VARIATIONS

For example: K4. Prepare environmental arguments against constructing a second international airport in the metropolitan area of Sydney. (Biddle, 1976, p. 36)

My own attitude to the teaching of concepts is that as teachers we have to analyze each of the topics we select with the object of identifying the major concepts and generalizations which will provide *meaning* or *understanding* for our students.<sup>21</sup> Consider, for example, the concept of a human organization system (see Fig. 9). If you have considered spatial systems in physical geography studies pupils will know that a system can be analyzed in terms of inputs, processes and outputs; that inputs can be analyzed in terms of information, energy and matter, processes as interaction, and outputs once again in terms of information, energy and matter.

If we apply this concept of a *spatial system* to the homes of pupils (see Fig. 10) we can provide a framework for investigating any type of human organization system.

A second example is an agricultural system which may be depicted as a conceptual model as shown in Fig. 11 or in Fig. 12.

The importance of people in human organization systems may be demonstrated in a simple model as in Fig. 13.<sup>22</sup>

At a more sophisticated level consider the analysis of a regional system. There are five related concepts which assist geographers to analyze a regional system (see Fig. 14). Students can use each of these concepts to assist them in interpreting topographic maps or aerial photos.

However, it is important for teachers to realize that *you cannot teach concepts in isolation*. The identification of concepts in an instructional unit or unit of study comes after you have selected the topic from the syllabus whether this is one you develop in the junior school or have supplied to you in the senior school.

Take for example a topic on urban geography from the senior syllabus:

'Environmental Pressures Generated in Sydney' (see Fig. 15).<sup>23</sup>

The first question is

What are the objectives of teaching this topic?

These are stated in terms of knowledge, values and skills.

The second question is:

What are the concepts pupils will need to understand this topic?

Then:

What kinds of problems do we ask the pupils to solve so that they will achieve these objectives?

<sup>21</sup> Lindsay Francis, 'What Do We Mean When We Say We Are Teaching Concepts in Geography?', *Geographical Education*, Vol. 12, 1975, pp. 315-322.

<sup>22</sup> D. S. Biddle, 'Human Organization Systems: An Approach to the Study of Geography', *Regional School in Geography*, Mudgee, 1977, pp. 1-16.

<sup>23</sup> D. S. Biddle, *Translating Curriculum Theory into Practice in Geographical Education: A Systems Approach*, GEMS No. 1, Australian Geography Teachers Association, Melbourne, 1976b.

Each time a teacher has to make a decision to select a particular topic for his pupils he or she should ask himself these questions. The next step is to prepare an instructional unit which identifies the objectives, the major concepts, and the exercises or problems pupils would have to investigate to achieve the objectives. The format the teacher uses for the instructional unit is dependent on his personal preferences and the one which they find the most effective to prepare and to use in the time he has available. If the teacher has no personal preferences he may find the format used in Fig. 15 a useful starting point.

## APPENDIX I: DEVELOPING CONCEPTS THROUGH SKILLS

### A. *Location*

1. All places are located somewhere.
2. Location may be determined by reference to a mathematical grid;  
e.g. latitude and longitude OR a reference system on a topographic sheet.
3. Location may be described by reference to other places;  
e.g. Taillem Bend is near Murray Bridge OR the farm is on the outskirts of the town.
4. Location may be described in terms of direction or distance;  
e.g. the farm is east of the town OR Elizabeth is approximately 27 Km from Adelaide.
  - 4.1 Combinations of these are possible  
e.g. Elizabeth is approximately 27 Km north of Adelaide.
  - 4.2 Distance can be measured in a number of different ways.  
e.g. in terms of meters, kilometers, etc. OR  
in terms of cost OR  
in terms of time OR  
in terms of effort (energy expended or frustration, worry).
5. The differences between site and location is important.
  - 5.1 Site deals with the 'internal' aspects of place.  
e.g. In examining a building block one is concerned with slope, drainage, soil prevailing winds, sun angles, etc.
  - 5.2 Location deals with the 'external' aspects of a place.  
e.g. The location of the building block is relative to streets, shops, schools, community centres, etc.
6. There is the need to make the distinction between central and marginal locations.
  - 6.1 Some characteristics of places are derived from their central or marginal locations.  
e.g. the provision of services in the inner city area as opposed to the urban rural fringe OR the amount of development and activity found around the farmstead as opposed to the farthest paddock on the same farm.
7. All people make locational decisions.
  - 7.1 At individual level;  
e.g. where to go for holidays, where to build a house, etc.
  - 7.2 At corporate level of individual firm;  
e.g. where to build a new factory.
  - 7.3 At Government levels;

e.g. where to build a new school, where to establish a recreational area, a road or a new town.

8. Reasons for locational decisions may be obscure and their basis change through time.

e.g. Some southern European cities were initially founded on craggy hills for defence reasons that are not applicable today OR a manufacturer located near the city market some years ago may now find the location untenable because there is no room for expansion, access is difficult because of traffic congestion, new processes require rebuilding a different sort of factory, etc.

9. Location can be considered at different scales.

e.g. Why a factory is located on a particular site in a particular suburb is of little or no significance when considering industrial location at a national level where factors such as proximity to markets and labour supply or raw materials might be predominant.

#### B. *Distribution*

1. One aspect of distribution is the areal or spatial patterns that derive from the arrangement of features on the earth's surface.

2. Spatial distribution is most often discussed by examining maps and vertical air photos.

e.g. a map showing land use zones OR from an air photo of metropolitan Adelaide it is possible to plot the distribution of main shopping areas.

3. The plotting of distributions of phenomena on a map is a means to the end of discovering, examining, and explaining relationships.

e.g. a map of wheat growing areas of Australia upon which isohyets or growing seasons have been superimposed is one means of moving towards an understanding of wheat growing areas.

4. Distribution patterns have three basic classes:

lines and networks — e.g. streams, field boundaries, traffic flows, street patterns, political boundaries.

points and nodes — e.g. farmsteads, houses, factories, settlements.

surfaces in which variations are continuous, e.g. atmospheric pressure patterns, surface elevation, wheat yields.

4.1 Pattern — the particular arrangement of phenomena within an area.

4.2 Density — the frequency of occurrence of phenomena within an area relative to the size of the area.

4.3 Dispersion — the extent of the spread of the phenomena within an area relative to the size of the area.

5. Spatial distribution enters most areas of study in geography.

e.g. we classify settlements as being nucleated (all points together) dispersed (points scattered) or linear (points aligned along some route as are oblong settlements in Thailand) OR we examine maps of rainfall distribution and hypothesise about agriculture; examine maps of rainfall and temperature distribution and hypothesise about effectiveness of rainfall. OR we talk about variations in the density of population throughout the metropolitan area, the state, the nation, or the world.

6. Another aspect of distribution is frequency distribution.

6.1 This type of distribution shows how things or events are arranged with respect to classes or to points on a measurement scale.

6.2 Frequency distribution is represented by a table, graph, or bar-chart.

7. Frequency distribution enters into many areas of geography.

e.g. climate graphs which plot temperature and rainfall values OR age structure of population OR variations in seasonal wheat yields.

8. Often geographers are concerned with combinations or aspects of both frequency and spatial distribution.
  - e.g. The seasonal occurrence of rainfall as well as total amount are important when considering the agricultural potential of an area. Twenty five inches of rainfall in parts of Southern Australia is more effective than 25 inches of summer rainfall in Northern Australia. OR A study could be made to record the frequency of accidents in Adelaide both in time (when they occurred) and space (where they occurred).
9. Distribution is affected by both change through time and variations in scale.
  - e.g. the spatial distribution of wheat growing areas in Australia have undergone quite marked changes with such things as development in technology, changes in land laws, developments in transport and seasonal variations in rainfall. OR the distribution of population can change with increase in population (the movements of population in Australia) or the moves to urbanisation. OR There has been a steady increase in the yield per acre of most agricultural products with the introduction of such things as fertilizers, improvement in farming techniques, and development of new strains of grain, fruit, etc. OR When examining the distribution of population in a suburb, particular streets may have a very high density of population because there are a large number of flats, whilst the district as a whole has a low population density because much of the suburb is industrial. OR The numbers of a particular weed on a farm as a whole may be low but very high in a particular paddock because of the special conditions that exist on that part of the property.

**C. Association**

1. The degree to which the distribution of two (or more) phenomena are similar.
2. 2.1 A study of associations may be the starting point for exploration:
  - 2.1.1 the similarity of the distribution of two (or more) phenomena may help the search for the factors affecting the distribution.
  - 2.1.2 the similarity of the distribution of two (or more) phenomena may help to explain how the distribution one affects the distribution of the other.
- 2.2 A study of associations may aid the search for causes of particular phenomena.
  - e.g. Outbreaks of disease that have a particular distribution pattern may aid the medical researcher in determining the cause by examining factors common to the places of occurrence.
  - e.g. The reasons for the outbreaks of amoebic meningitis in South Australia were determined by associating common characteristics
    - the distribution of people affected
    - the distribution of water supply
    - the distribution of nasal infections
    - the distribution of particular climatic characteristics.
3. 3.1 The most common method of studying or revealing association of phenomena is by comparing distribution maps.
  - e.g. the distribution of many agricultural activities can be partly explained by examining such maps portraying soil, rainfall, slope, (etc.) and product distributions.
- 3.2 The statistical techniques of scatter diagrams, that reveal positive and negative correlations is a more sophisticated technique.

4. In studying the association between distribution patterns one should be careful of assuming direct cause — effect relationships, for many other factors may be involved.

e.g. a climate map of Australia and a map showing distribution of grain growing areas cannot be considered a direct cause-effect relationship for factors such as availability of transport, fertilizer inputs, government policies, historical developments, etc. all contribute to explaining the distribution of grain growing areas.

#### D. Movement

1. The explanation of most distribution patterns involves making use of the concept of movement.
5. Movements can be considered to take many forms.
  - e.g. 5.1 The movements reflected by the transport of goods.
  - 5.2 The movements taking place in physical processes — water, waves breaking, rain falling and so on.
  - 5.3 The movement of people to and from work, or from one country to another, from home to holiday resort.
  - 5.4 The movement of animals and birds in seasonal migrations.
  - 5.5 The movement of ideas as involved in cultural diffusion.
6. Some movements give rise to well defined routes, networks and nodes.
  - e.g. 6.1 Tracks through the jungle made by hunting and gathering groups.
  - 6.2 Highways, roads and railways.
  - 6.3 River courses, glacial valleys and fault lines.
  - 6.4 Air routes and shipping lanes as well as the movements of pressure systems and air masses, although not "present" as features in the landscape, can be plotted and marked on maps.
7. Trade is the reflection of movement that takes place because men exchange goods and services. It is the movement involved in trade that gives rise to the many complex networks that are studied in human and economic geography.

#### E. Interaction

1. Two or more phenomena act reciprocally.
2. Essentially this is a concept involved with process; therefore an adequate understanding of what happens and how it happens is implied. However there is a limit to the stress to be placed upon process; studies in depth upon process are rarely appropriate for track 1 geography. What is needed is an understanding of the conditions under which interaction may occur, and the result of specific interactions.
3. Interactions occur between phenomena in the same place and between phenomena in distant places.
  - 3.1 Phenomena in the same place interact: this may lead out from the concept of a real association.
  - 3.2 Phenomena in distant places interact; this may lead out from the concept of movement.
  - 3.3 Complex interactions involving numerous phenomena are frequently explained in terms of a system.
4. Examples of interaction are:
  - 4.1 development of horizons in a soil profile. (Interaction of water and soil particles involving vertical movement at a microscale.) The conditions of climate, drainage, etc. under which this interaction occurs, and the end result seen as observable horizons — these are what matter. The complex processes of solution, precipitation, chemical change and sorting of soil particles — these are NOT as important in track 1.

- 4.2 Investment of British capital/managerial expertise in India to create tea plantations which in turn increased the consumption of tea in Britain. (Interaction of phenomena in distant places.) The circumstances under which capital and management were available and drawn to India and the resultant modification of the landscape and economy — these are what matter. The details of tea propagation, etc. and the processes by which tea is manufactured from the leaves of the tea-bush are *NOT* so important.
- 4.3 An urban system of commerce, industry, people and transport resulting in specialization of area within the city (complex interaction).

**F. Concept of Energy**

**1. Explanatory Statements.**

- 1.1 Energy is the force that produces movement over the earth's surface.
- 1.2 Energy is involved in all forms of interaction.
- 1.3 Movement is one expression of expenditure of energy.
- 1.4 Variation in the application of energy from place to place is a critical factor in the differences between one part of the earth's surface and another.
- 1.5 Variation in the application of energy from time to time is a critical factor in areal change.

**2. Sources of Energy.**

- 2.1 Radiant energy of the sun, the prime source.
- 2.2 Fossil fuels: petroleum, gas, coal, nuclear fission, for the generation of power.
- 2.3 Energy of living things: in particular man and animals.
- 2.4 The energy of man is expressed not only in physical activity but also in his ability to organize himself and society in order to satisfy his needs. Within this context, capital is a form of energy.
- 2.5 Internal energy of the earth.

**3. Examples of energy.**

- 3.1 The organizational energy of man in harnessing other forms of energy, e.g. steam, electricity, internal combustion; including the mining, distribution and application of fossil fuels.
- 3.2 Radiant energy of the sun produces the general circulation of the atmosphere, ocean currents, the hydrological cycle and the cycle of energy in eco-system.
- 3.3 Internal energy of the earth produces earthquakes, volcanoes and earth's gravity.
- 3.4 Investment of capital and labour to promote the production and exchange of goods or to provide services such as transportation, schools, fire-brigade.

5. Destructive energy as in forest fires, storm surge and avalanche.

6. Animal energy as in the burrowing of animals or an ox-drawn plough.

**G. Areal Change**

**1. All parts of the earth's surface are subject to change:**

- 1.1 human elements of an area as well as physical and biotic elements are subject to change.
- 1.2 change may be considered to occur as the result of variation over a period of time in the application of energy within an area; the notion of sequent occupance is relevant.
- 1.3 change may be reflected by variations in the quality and intensity of interactions.



- 1.4 Change has frequently arisen in association with the creation of a new resource, or the exhaustion of an old one.
- 1.5 New patterns of distribution frequently are associated areal change.
2. Time element:
  - 2.1 Change may take place slowly or rapidly; occasionally instantaneous change occurs. Even so the time factor is always involved.
  - 2.2 Rate of change is an important consideration in this concept. Man frequently accelerates the rate of change.
  - 2.3 Rates of change vary from one area to another. Such areal variations in rate of change lead, over a period of time, towards differences between one area and another.
3. Examples of areal change:
  - 3.1 effect of repeated burning at the edge of tropical rain forest is thought to have caused savanna to displace forest.
  - 3.2 Overstocking in marginal grazing areas and cultivating in other marginal lands has caused such areas to deteriorate. Decline of agricultural resource potential.
  - 3.3 Urban blight areas; growth and redevelopment.
  - 3.4 Ancient historical approach, classical cities; e.g. Palmyra (Syria), Anuradhapura (Sri Lanka). Changes in energy inputs (human organization) which permitted their growth and decay.
  - 3.5 Recent historical approach; new world migrations associated with cultural diffusion which changes the area in which settlement finally takes place. Decline of Australian rural towns with the revolution in transportation.
  - 3.6 Creation of new towns in formerly farming area; e.g. Canberra, Monarto; also the growth of suburbs over market gardening areas, as in some areas near Adelaide.
  - 3.7 Instantaneous change; Krakatoa, volcanic islands near Iceland, earthquake, the razing of cities by armaments.
  - 3.8 Soil erosion accelerated by man; re-afforestation.
  - 3.9 An inner city suburb contrasted with an outer commuters' zone for variations over time in the availability of social capital (energy). The character of both areas changes, and the change is highlighted by contrast.
  - 3.10 Mining towns; exhaustion of resource or change in economic climate leading to boom/decay.

*Refs.* Education Department of South Australia, *Junior Secondary Geography Curriculum, Teacher's Advisory Notes*, HMSO, Adelaide, 1972; *idem*, *The World is Your Oyster*, HMSO, Adelaide, 1973; M. McCaskill, *Patterns on the hand: Basic Concepts in Geography*, 2nd Edn., Hongman Cheshire, Melbourne, 1977.

# LAOS: THE TRANSPORTATION PROBLEMS OF AN INDOCHINESE LANDLOCKED STATE<sup>1</sup>

by

PETER C. N. HARDSTONE<sup>2</sup>

## ABSTRACT

Nations of the world which do not enjoy the benefits of a seacoast, due to their geographical location, are known as "landlocked states". Whilst some such states can employ their technological wealth and abilities successfully in their efforts to secure access to the sea (e.g. Switzerland utilises the River Rhine as one of its transport links to the outside world), many landlocked states suffer not only from the geographical disadvantages of location but also are often lacking in economic wealth or experience poor relations with neighboring states upon whom they must rely for maritime access. Strained diplomatic ties can aggravate already existent difficulties and can place a severe restraint upon the nation's chances of economic survival. This paper examines the particular transportation problems of Laos as an Indochinese landlocked State.

The Laos People's Democratic Republic is Southeast Asia's most geographically-disadvantaged state. It possesses few natural resources of commercial significance and with an area of 234,000 km<sup>2</sup> and a population of only 3.1 million, most of whom exist in widely-scattered rural locations, it suffers the problems of inaccessibility both from the outside world and from one location to another within its own borders. In order to appreciate the background to the nation's present transportation difficulties, it is necessary to view Laos' development from a historical perspective.

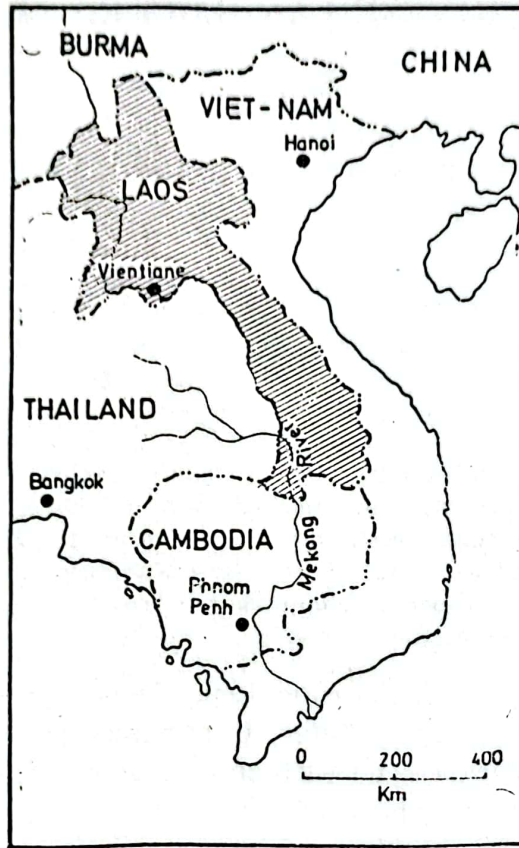
(i) *The French Colonial Period.* — Laos first came under French administration in the latter half of the nineteenth century but, since that time, has never enjoyed the same degree of development as had the more easily-accessible lands of Cambodia and Vietnam. Although the three states were grouped administratively as one (French Indochina) Vietnam and, to a lesser extent, Cambodia were commercially by far the most important. The large port city of Saigon-Cholon was itself a French creation — government administration, transportation and the economic system of Vietnam focussed upon both Saigon-Cholon in the South and Hanoi-Haiphong in the north. The latter, whilst not initiated by the French, was nevertheless substantially developed during the colonial

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<sup>1</sup> This paper was presented at Nanyang University as a Joint Seminar of the Programme of Southeast Asian Studies, the Department of Geography and the Institute of Humanities and Social Sciences on 6 January 1978.

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THE LOCATION OF LAOS AS A LANDLOCKED STATE

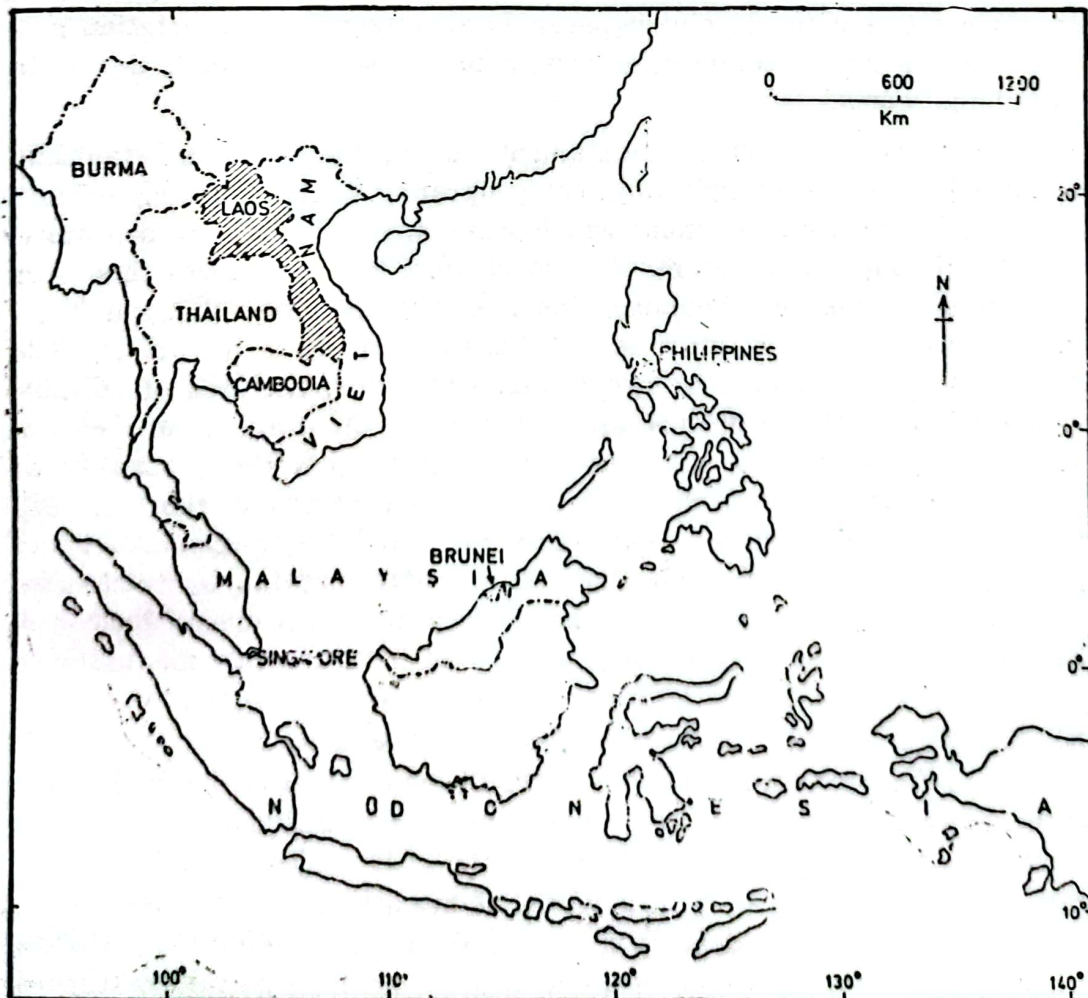


period. Saigon and Hanoi were located on major rivers (the Mekong and Red River respectively) both of which flowed into the South China Sea and although Phnom Penh, Cambodia, was more distant from the sea the Mekong River (on which this city also stood) flowed towards its delta in the southern reaches of Vietnam. Ease of access together with an important administrative and cultural role resulted in Hanoi and Saigon growing rapidly in population and by the eve of independence from French colonial rule in 1954 the latter had already reached the one million mark. Although the more distant rural areas of Cambodia and Vietnam maintained the elements of a variety of local, indigenous cultures the major urban areas had all embraced aspects of the French way of life—language, catholic church, school educational system and an Asian aristocracy who assisted in the task of governmental administration in co-operation with French officials. Whilst such developments proceeded space, commercial interests were likewise nurtured with the result that only was the physical landscape changed by new plantation crops and their resulting agricultural patterns but the political administration and economic transformation both required the development of a transportation network in order that the major obstacles of geographical distance could be mitigated. In this respect, the French constructed a direct railway line which followed the coast of Vietnam for much

of its course between Hanoi and Saigon and road links were also developed which gave access to the most significant of population concentrations. In the years up to the Second World War land communications in Vietnam and Cambodia were improved and, in the post-independence era, the Republic of (South) Vietnam was to enjoy the benefits of a massive road-building effort as part of the American military aid programme. Notwithstanding these developments in the states of its Indo-chinese neighbours, the position of Laos was substantially different due to its particularly difficult geographical environment.

(ii) *Post-independence Period: 1954-1975.*—On independence from French colonial rule in 1954, Indochina was politically divided into states which were to become the focus of world attention. The northern part of Vietnam, north of the seventeenth parallel of latitude, was termed the Democratic Republic of Vietnam (DRV) and developed a Marxist economic and political structure under the leadership of Ho Chi Minh. The southern half of the country became the Republic of Vietnam and

### THE POSITION OF LAOS IN SOUTH EAST-ASIA



was increasingly supported, particularly after 1965, in its anti-communist stand by military and economic assistance from the United States. Meanwhile, whilst Laos and Cambodia were not involved directly in the ideological clash of competing systems of communist and capitalist society (at least until after 1970), the former played a crucial role in Indochina's political development as, in 1962, Laos was officially declared a neutral and buffer state (between communist North Vietnam and pro-western Thailand) and this neutrality was to be guaranteed by the Geneva Accord of which Britain and the Soviet Union were co-chairmen.

The nominal degree of neutrality which existed in Laos after 1962, together with a programme of economic assistance from France and the United States, provided an opportunity for communications development because as an independent, but neutral, land-locked state the successful integration both of regions and of peoples in Laos necessitated such development. Furthermore, all commercial traffic from and to the state would be required to transit a neighboring state in order to reach a sea-coast. During the period after 1962, therefore, Laos' neutral co-alition government utilized the most efficient communications outlet to the sea—via neighboring Thailand. The Lao capital of Vientiane would therefore act as a focal point between Laos' internal transportation network and its major commercial artery to the sea-coast and, hence, to the outside world.

The lines of internal communications in Laos are substantially influenced by the country's physical geography. The most significant waterway is the River Mekong which rises in China and flows towards its delta in southern Vietnam. For more than 800 kilometers this river constitutes the political boundary between the Lao Republic and Thailand. Although a direct route to the sea, the Mekong is in fact of little use due to the prevalence of rapids and waterfalls, the lack of suitable river craft and the problems associated with the international (Lao-Thailand) boundary and with the need to rely upon the generosity of two foreign states, Cambodia and Vietnam, for access to the sea. Although the major towns of Luang Prabang, Thakhek, Savannakhet and Pakse are linked to Vientiane, the administrative capital, by road these roads are difficult to maintain on an all-weather basis due to inclement climatic conditions and the hazards associated with a highly mountainous terrain. It is indeed this lack of road communications that prompted both the French and, particularly, the Americans to render assistance but, even with such aid, road improvement schemes are still inadequate. Furthermore, Laos has no railways and whilst air-communication is potentially the most feasible and often the only way of reaching some locations, it is ironical that in a world of twentieth century technology, Laos remains so under-developed in communications facilities; indeed, the role played by the elephant as a medium of transportation still remains one of some considerable significance.

ROUTES TO THE SEA FOR LAOS (1978)



In terms of external communications links, the geographical location of Laos renders the country's eastern border no more than 100 kilometers from the South China Sea but this border follows closely the trend of the Annamite cordillera and such a mountainous frontier region has always rendered access to the sea difficult for many centuries. During the colonial period, however, the French did undertake construction of three roads which were intended to provide direct access to the South China Sea and, although completed shortly before World War II, were all difficult to maintain and were too treacherous for much heavy motorized traffic. Indeed, some stretches of these routes would be difficult of access during the rainy season with the result that Laos would still remain well-nigh isolated. Although the French developed a direct rail link between Hanoi and Saigon in Vietnam, this line was easy to construct and profitable to operate due to its largely coastal location and the fact that it connected Indochina's major centers of population. The north-south road followed a similar course. The east-west transit from the Vietnam coast into Laos was, however, a totally unproductive venture from the standpoint of communications engineering and the lack of commercial traffic on even the routes which did exist served only to underline this fact.

During French times Laos, Cambodia and Vietnam were adminis-

tratively one unit; Laos, at this time, was not therefore technically considered as landlocked. Its administrative association with Cambodia and Vietnam did at least provide a potential for the development of various routeways to the sea-coast; the problem was one of the influence of a complex of factors of a physical, rather than of a political, nature. In this respect the Mekong's many rapids limited movement along this waterway, notwithstanding the fact that this route was virtually the only one available for movement until the time of World War II. During the war one highway was constructed which linked Laos to Saigon via Cambodia. This, together with the Mekong, was only southern outlet for Laos. In the north, the physical nature of the mountainous terrain makes access into Burma almost impossible whilst movement into China is not economically feasible since traffic would be travelling away from, rather than towards, the ocean. Furthermore, rugged terrain, a sparse population and an absence of commercial crops and markets would render such movement impractical.

The departure of the French political and military administration from Indochina in 1954, the independence and the division of the area into four separate political units was to have far-reaching effects upon the pattern of transport and communications development in Laos. As an independent Kingdom,<sup>3</sup> now separated from Vietnam and Cambodia, the state had become geographically landlocked as it possessed no sea-coast. It would henceforth need to rely upon one or more of its neighbouring states for access to the ocean for its commercial traffic. This position therefore resulted in Laos' future development being dictated not only by difficult physical conditions but also by the changing political relationships between the Lao government in Vientiane and the governments of the outside, in particular those of its neighbors.

During the period after independence and especially after the 1962 Geneva Accord, which technically guaranteed the nation's neutrality, Vientiane developed increasingly close political and commercial relations with neighbouring Thailand. A political climate of mutual respect and co-operation was to play a vital role in the re-orientation of much of Laos' commercial traffic away from routes to the sea which were employed in French times (e.g. the River Mekong) to a route across Thailand which would directly link Laos to Bangkok, Thailand's capital and a leading seaport for ocean-going vessels.

The Thai rail network had been initiated during the time of king Chulalongkorn (1868-1910) and had not only extended to various parts of the Thai Kingdom but also reached to join the Malayan network to the south. The line to the northeast, however, terminated originally at Udon Thani but was subsequently extended to the Mekong River town

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<sup>3</sup> From independence in 1954 to the declaration of the Lao People's Democratic Republic in 1975.

of Nong Khai. This extension was completed in 1955/56, little more than a year after Laos had achieved independence, but was to prove the most effective route to the open sea; the only potential difficulty was to organize the flow of commercial traffic from Vientiane across the Mekong to Nong Khai. From this Thai railroad Bangkok could be reached in ten hours. In the context of this route, an agreement signed in July 1955 has allowed the transit of foreign goods destined for Laos to cross Thai national territory from Bangkok port to Nongkhai/Vientiane and all such goods are exempt from customs levies. During the decade of the sixties this route developed to become Laos' principal land communications artery. Vehicles, oil and consumer goods were moved to Laos in freight wagons on the Bangkok-Nong Khai rail-line.

Whilst this period of cordial political relations with neighbouring Thailand proved convenient to Laos in respect of the utilization of a direct communications link to Bangkok, the hidden danger in developing so heavy a dependence upon this one route of access was nevertheless evident. If, in the future, the outcome of big power politics was to change the value of Laos to outside interests or if the governmental systems of either Laos or Thailand were to experience a change in the accepted status quo of the 1960's, then such political events could be troublesome to landlocked Laos as Thailand held the key to the effective operation of the Lao import/export economy.

(iii) *Post-independence period: 1975-1978.*—In 1975, political events occurred in Southeast Asia which were to have important repercussions for Laos. The Republic of (South) Vietnam was subjected to a series of swift campaigns from the north and, as the Americans were forced to withdraw the last of their military assistance to the southern government, President Thieu's regime<sup>4</sup> collapsed to the Communists on 30 April 1975. On 17 April Cambodia's pro-western government, headed by Lon Nol, had also surrendered. Communist rule now extended to the Thai border. Unable to continue to balance the political factions of rightist (royalist) and pro-communist (Pathet Lao) in its internal affairs, the kingdom of Laos, notwithstanding the Geneva accord and the neutrality agreement, succumbed to the same fate in December 1975 and was swiftly to come under the military hegemony of a powerful Vietnamese army directed from Hanoi. The Lao government, as a communist republic after the abdication of King Sri Savang Vatana, was now to share a political border with Thailand, a nation which had shown determination to remain non-Communist. Henceforth, the Lao and Thai governments were to be orientated in different political directions (Laos towards the Soviet bloc and Thailand towards the west) and this was to manifest itself in the relationships between the two states. Thailand

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<sup>4</sup> President Thieu was the last president of South Vietnam. After the collapse of South Vietnam in April 1975, the new government stated its intention to unify the country. It was henceforth to be known as the "Socialist Republic of Vietnam" (SRV).



had for long been host to a Lao minority population who had resided close to the Lao border but nevertheless within Thai national territory; after 1975 Thailand was to receive an inflow of refugees who moved out from Laos before the military authorities there had been able to seal the border. Such movement, across the Mekong river, was to precipitate a number of border skirmishes between Thai and Lao troops and, during 1976, Thailand's reaction was to apply political pressure upon the new Lao government. In this direction Thailand held a key weapon—the Lao transit rights to Bangkok. Friction between the Thai and Lao governments during 1976 and 1977 has resulted in Bangkok placing a complete ban on the export of strategic materials to Laos. More significant from Laos' viewpoint as a landlocked state, however, is the ease which Thailand is able to halt, albeit temporarily, the flow of other non-strategic but nevertheless vital supplies. In October 1977 the Thai government halted all shipments of petroleum to Laos from the Shell Oil Company in Bangkok, supposedly as a retaliation against the appearance of a fleet of Soviet built MIG 21 jet fighters at Vientiane's Wattay Airport. It was not immediately clear precisely what purpose these aircrafts were to serve in Laos but the Thai government had misgivings should the petrol supplies be utilized to fuel these planes. If so, petrol would then need to be placed under the strategic materials classification and so could be denied to Laos indefinitely. As it happened, however, the Thai government decided subsequently to lift their ban on petrol shipments across the Mekong River but approval for all future shipments would need to be secured from the Bangkok government.

This incident served to highlight the vulnerable position of Laos, as a 'geographically-disadvantaged' landlocked state which lacks a sea-coast and must therefore depend upon neighbouring states for coastal access. In the case of Laos, further disruption of petroleum supplies is likely to have grave consequences if the Thai supply line is to be the only link to the outside world.

Under these circumstances, it has become necessary for the Lao government to re-appraise their need for new commercial outlets to the sea. Notwithstanding the physical factors of geography (rugged terrain) together with problems of economics (small widely-dispersed populations, inadequate markets, poor internal communications and a general lack of development), Laos has been forced to re-orientate its access links in the direction of its current political alignment —i.e. increasingly towards a Communist Vietnam. Vietnam maintains armed forces in Laos and Lao-Vietnamese relations are cordial, as are those of Vietnam towards the Soviet Union. The result of this is that the Soviet Union is increasingly coming to play a key position in Laos' political, economic and military development. Relationships between

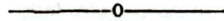
Laos and neighbouring Kampuchea (Cambodia) have, on the other hand, been strained as Cambodia finds her chief ally in the People's Republic of China. This, together with Kampuchea's strong tendencies towards diplomatic isolation from the outside world, would seem to effectively preclude there being any possibility in the foreseeable future of the development of land links from Laos to the sea via Kampuchea. These frictions between Laos/Kampuchea and Laos/Thailand are therefore likely to result in the construction of links to the sea via the Socialist Republic of Vietnam. Indeed, plans in this direction are already under active consideration. With economic aid likely to come both from a now-friendly Vietnam and also from the Soviet Union, modern-day technology will be much more able to overcome the physical difficulties of climbing the cordillera, along which the Vietnam-Lao border runs for part of its length. It is also proposed to build a new road from Thakhek to Danang. The latter town possesses a port which was constructed by the Americans during the sixties and which was fitted to receive ocean-going vessels. A road link from Laos would therefore be a vital route to the sea and oil, transport equipment and foodstuffs could be readily imported from this direction. Likewise, a route from Vientiane to the Vietnamese port of Vinh is also a possibility; similarly, a railway from Thakhek to the towns of Tan Ap or Vinh is likely to be feasible, given the changed political relationship between Laos and neighboring Vietnam after December 1975. Any or all of these routes from landlocked Laos to the South China Sea could, if constructed, afford a suitable alternative outlet for Laos in preference to that currently employed from Nongkhai to Bangkok. On the other hand, should relationships between the Lao and Thai government improve to the point of complete normality, and there are at present hopeful indications in this direction, then Laos could effectively utilize routes through both Thailand and Vietnam, and such routes would be of immense benefit.

Geographically disadvantaged, economically under-developed but now politically undergoing a major realignment in its policies, the landlocked Lao People's Democratic Republic, with the assistance both of Socialist Vietnam and of non-Socialist Thailand, may yet secure the chance to become a viable nation-state.

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## PHYSICAL FEATURES

### Republic of the Philippines

#### Location

The Philippines consists of a group of islands on the western rim of the Pacific and stretches more than a thousand kilometers north to south between Taiwan and Borneo. The country strategically lies within the arc of nations that sweeps south-eastward from mainland Asia to Australia. North of the country are the Republic of Taiwan and the People's Republic of China; to the northeast is Japan, and to the south and southwest are the other Southeast Asian nations of Burma, Thailand, Cambodia, South Vietnam, Laos, Malaysia, Singapore and Indonesia. At its extreme southeast are Papua New Guinea, Australia and New Zealand.

#### Territory

The total land area of the Philippines is 300,000 square kilometers, with Luzon, the biggest island, accounting for 141,395 square kilometers and Mindanao, the second largest, with 101,999 square kilometers. There are 7,100 islands and islets within its territory, making it one of the largest archipelagoes in the world in terms of number of component islands and islets.

#### Regional Delineation

The country is subdivided into twelve (12) regions: Region I (Ilocos), Region II (Cagayan Valley), Region III (Central Luzon), Regions IV and IV-A (Metro Manila and Southern Tagalog), Region V (Bicol), Region VI (Western Visayas), Region VII (Central Visayas), Region VIII (Eastern Visayas), Regions IX-A and IX-B (Western Mindanao), Region X (Northern Mindanao), Region XI (Southern Mindanao), and Region XII (Southwestern Mindanao).

Source: Realizing the Vision of a New Society. National Multi-Year Human Settlements Plan 1978-2000.

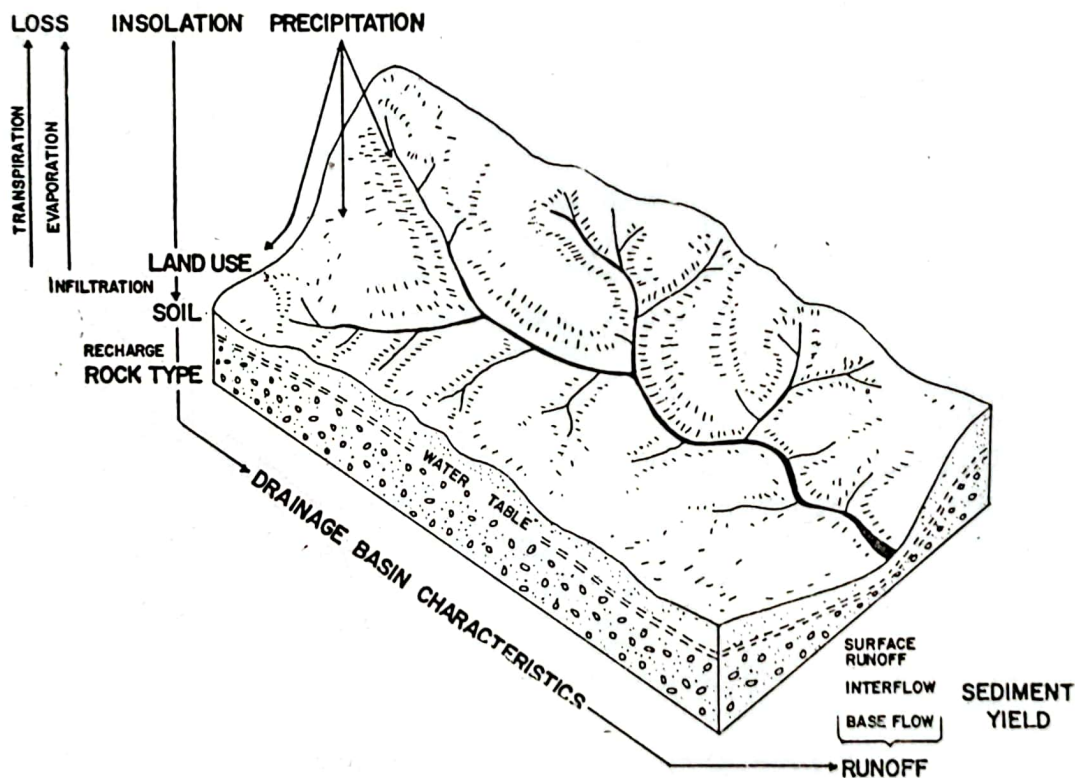
# WATERSHED AS A PLANNING UNIT<sup>1</sup>

by

R. C. BRUCE<sup>2</sup>

## PHYSICAL CHARACTERISTICS OF THE WATERSHED

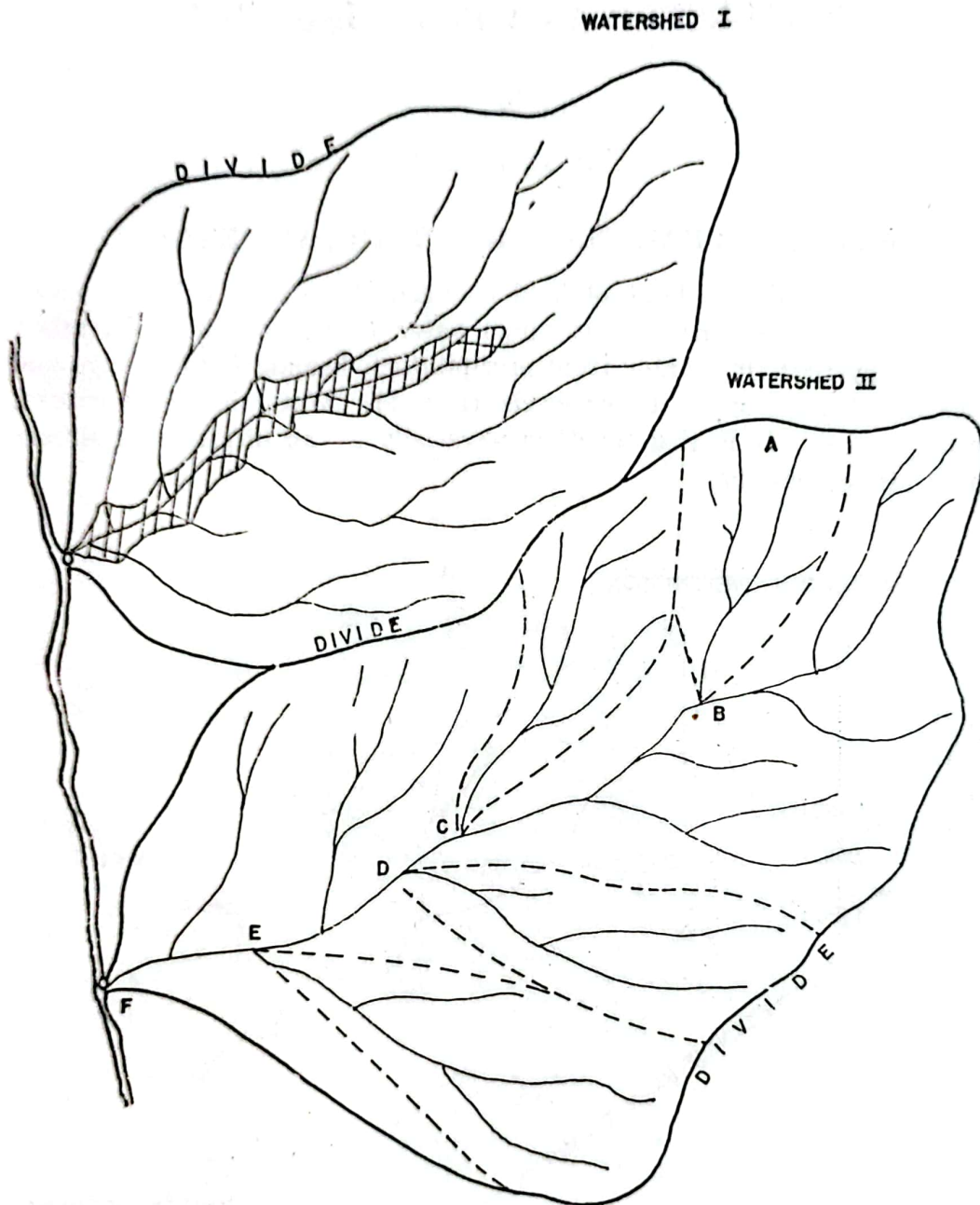
A watershed is a body of land bounded above by a ridge or water divide and below by the level at which water drains from it. Watershed operates by receiving water from precipitation, holding it in storage and releasing it for flow to lower levels (Fig. 1). Watershed is a natural drainage area. It is tied together physically by an interrelated stream and drainage pattern.



**FIG. 1** THE WATERSHED AS AN OPEN SYSTEM, MAINTAINED BY THE CONSTANT SUPPLY AND REMOVAL OF ENERGY. THE DRAINAGE BASIN RECEIVES ENERGY OR INPUT FROM PRECIPITATION AND INSOLATION, AND LOSES ENERGY OR OUTPUT THROUGH THE WATER AND SEDIMENT LOST TO THE BASIN, LARGELY THROUGH THE RIVER MOUTH, AS WELL AS THROUGH EVAPOTRANSPIRATION

<sup>1</sup> Paper presented at the Seminar Workshop on Integrated Rural Area Development Approaches, December 6-7, 1977, U.P. Los Baños.

<sup>2</sup> Professor of Photo Interpretation, College of Engineering, University of the Philippines.



### HYPOTHETICAL WATERSHEDS

FIG. 2

Figure 2 illustrates the drainage pattern of a watershed. Rain falling at Point A either soaks into the ground or moves overland to drainageways or waterways. From there it moves to small creeks and on to Point B, and thence to Point E, continuing to be fed by other small and intermediate-sized streams such as C, D, and E. Within a particular drainage area, the farther one gets downstream, the larger the available supply of stream water and the larger the capacity of the

stream channel to carry. The implication is that there may be a small watershed problem without there being a problem in the larger watershed.

There are several additional characteristics of the watershed that need to be considered:

1. The physical condition found in a watershed are dependent on happening upstream but relatively independent of happening downstream. Thus, physical conditions in Watershed B can affect conditions at point C, but the reverse is not true.
2. Two independent watersheds may be interdependent when considered as parts of a larger watershed. Thus, sub-watershed B and C and physically independent when considering happenings within either watershed, but they are interdependent when considering the larger watershed of which they are an integral part.

These characteristics can be illustrated by reference to Watershed I and II in Figure 2. Assume that flood problem exists in the hatched area of Watershed I. No measure in Watershed II could provide flood control in Watershed I. The two watersheds are not hydrologically related through a common stream at the location of the flood problem. Similarly, a structure completely stopping the runoff from Watershed C, would have no effect on a flood problem within area B, which is upstream. Conversely, completely stopping waterflow from area B could have an effect on a flood problem within area C, depending on the size of area B in relation to the total drainage area about Point C. In any case, the effect would be minor, extending only the distance upstream in area C affected by backwater from the major stream to which sub-watersheds B and C both contribute. However, there is a more significant interrelationship between these two sub-watersheds resulting from the fact that both contribute to streamflow downstream from Point C, and therefore the floodplain below this point is common to both drainage areas.

The physical characteristics of the watershed are also of significance for development purposes other than flood control. For example, a proposal for draining wet lands in area B could not be effectuated by corrected measures in area C and vice-versa. However, both areas could be involved in a drainage project for the larger stream to which they contribute waterflow.

A project proposed for irrigating lands in area B would require that water be impounded in area B near the land to be irrigated in view of the high cost of transporting water from other watershed. Here again surface water storage conditions in area C would be independent of the need for irrigation water in area B.

For municipal and industrial use it may be economically feasible to store surface water in one watershed and transport it for use in another, thus overcoming the natural hydrologic independence of the two watersheds. Ground water is also a source of municipal and industrial need for water and become independent of the watershed conditions. Likewise, recreation services can be expanded independent of the watershed, since non-water-based recreation can be developed.

The land and water development fall into two broad categories:

1. Those developed for which consideration of the physical characteristics of watersheds is necessary. Example: flood control project, drainage improvement project, irrigation project.
2. Those development for which consideration of the physical characteristics of watershed is desirable but not necessary. Example: recreation and municipal and industrial water supply.

However, because of complimentarity of many land and water development purposes and the economies associated with multipurpose development, it is desirable to plan development projects in the second category along with those in the first. This will integrate the development of all land and water resources with the watershed and enhance its usefulness as an entity of planning.

#### WATERSHED AS A CONCEPT IN ECONOMIC POLICY

The demand for the main products of a watershed-hydroelectric power, water, timber, livestock, agricultural crops and recreation is increasing as population increases. This increase gave new significance to the control of floods, to soil erosion, to sedimentation of reservoirs and canals, to drainage. This physical and economic interrelations force consideration of the watershed as unit in economic policy. This emergence of the watershed as a concept in economic development drew two important conclusion:

1. The physical and economic interrelations that make the watershed a unit operate largely on the side of production and not on the side of consumption. Consumption of the products of a watershed may take place outside of the watershed and such consumption need not be interrelated.
2. A watershed as a conceptual unit is dynamics. Dynamics, not merely in terms of time, but an explicit consideration of changes in technology, preference and institution.

Watershed is a desirable unit for planning land and water resources. But it does not imply that solutions for all land and water problems must be planned in relation to the watershed. Problems significantly related to the hydrology of the drainage area should be considered in

watershed planning. Involved here may be transportation, power, recreation and stored water supplies for various uses or the reduction of soil erosion, floods, sedimentation and poor drainage. Other important things to consider in watershed management is disassociation of cost and benefits. This can be illustrated by considering hypothetical watersheds in Figure 2. The movement of water from higher to lower portions of the watershed may result in damages to upper and lower parts of the watershed, but usually the latter. When measures are taken to reduce these damages, costs must be incurred in the upper part that result in benefits to the lower part of the area. There is disassociation of benefits and costs when these two parts are under different ownership or political jurisdiction. An example is Agno River basin where the upper portion is in Mountain Province but pouring its destructive flood in Pangasinan province.

### RIVER BASIN AS AN ENTITY FOR LAND AND WATER RESOURCES DEVELOPMENT

The distinction between watershed and river basin has been one of size only. Small drainage areas are appropriately referred to as watershed, and the larger drainage area as river basin. Cagayan River basin has a drainage area of about 25,000 square kilometers. The basin is fed by many rivers and streams which are tributaries of Cagayan River. Drainage areas of each of these tributaries may appropriately be called watersheds. In many cases, however, the same drainage area has been referred to as both a watershed and a river basin. No sharp distinction between the two terminologies was made in this paper, although it is implied that river basin is much larger than watershed.

Flood control structures — dam, levees, floodways and channel improvement, can be installed in small watersheds as well as in larger basins. When installed in small watersheds, these works can be effective in that watershed but only partially effective in alleviating downstream flood problems. As watershed increase in size, social, political and economic institutions may become more important. In the case of Cagayan River Basin or Bicol River Basin, there are several provinces which the basin encompasses. Each province has its own economic, social and political characteristics. The larger the watershed becomes, the greater will be the level of organizational hierarchy. The rural residents will probably respond very differently to a stimulus placed before them by a group representing a larger river basin than one by a smaller group from the small watershed in which they have a part.

Because of organizational problems, a planner would be inclined to think that the small watershed has more to contribute in land and water resources planning. River basin development is a program of investment that will enhance the economic productivity of an integrated



river system. The river is the key resource to be manipulated. Therefore, in the design of a river basin development program, the water in the watershed should be managed to make the greatest possible contribution to the net benefits derived from the river basin as a whole.

### IS WATERSHED AN ADEQUATE PLANNING UNIT

The question of whether watershed or river basin is a necessary and/or sufficient unit for planning purposes may differ with each area subject to development. Certain combinations of physical, economic, social and institutional factors may make one watershed or river basin an adequate planning jurisdiction. An understanding of the need of the region/community is fundamental. If the need is to have more usable water or to keep floodwater in the channel, the watershed is sufficient planning unit. If the need is to reduce losses resulting from floods which require solution other than water management, then different planning jurisdictions are involved. River navigation, irrigation, hydroelectric power, or water recreation would require watershed or river basin planning.

Water development planning has become the vehicle for regional economic development. There are several concepts which may guide planners in designing relationships between watershed development, river basin development and planning:

1. Drainage basin as a development unit should be viewed only as a production facility for water services.
2. Water production planning should be formulated in relation with comprehensive planning. In areas where regional development is the expressed need, and water is the key to development, plans for regional development and water production should be integrated within a drainage basin. In other areas, the planning jurisdiction may dominate and overlap the drainage basin. Here drainage basin as a development unit is difficult to conceive. This situation occurs in sprawling metropolitan areas where urban and water development develop intricate interdependencies.
3. The identification of who benefits and who pays in terms of their location relative to the watershed, the river basin, the comprehensive planning region, and government jurisdiction are major factors in political decision implicit in watershed development.

### BENEFITS FROM WATERSHED DEVELOPMENT

The purposes of watershed development depends on a number of factors. The primary consideration is the potential of the watershed area for resource development. The ability and interest of local government

# PHILIPPINES WATER RESOURCES REGIONS

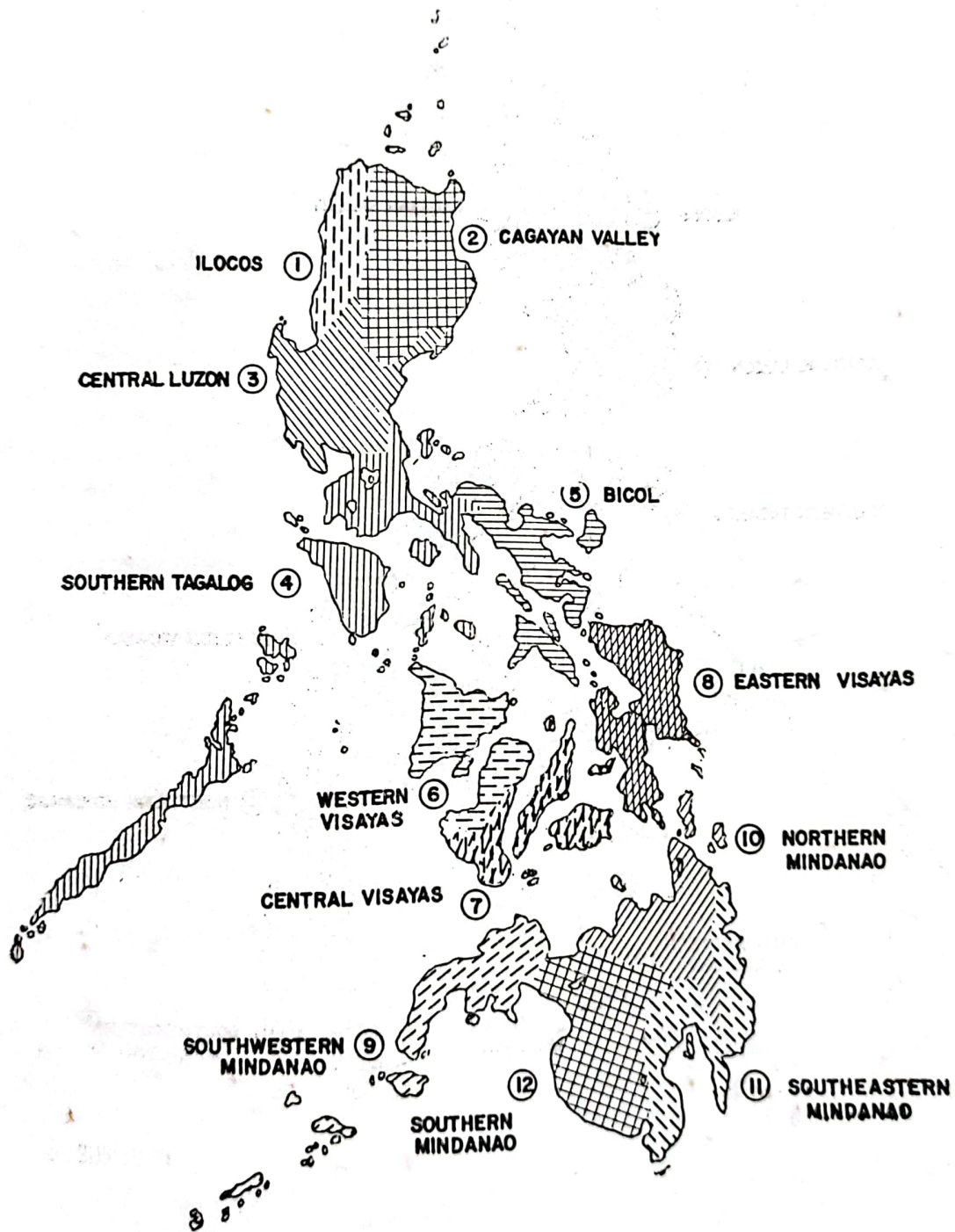


FIGURE 3

### PHILIPPINES POLITICAL REGIONS

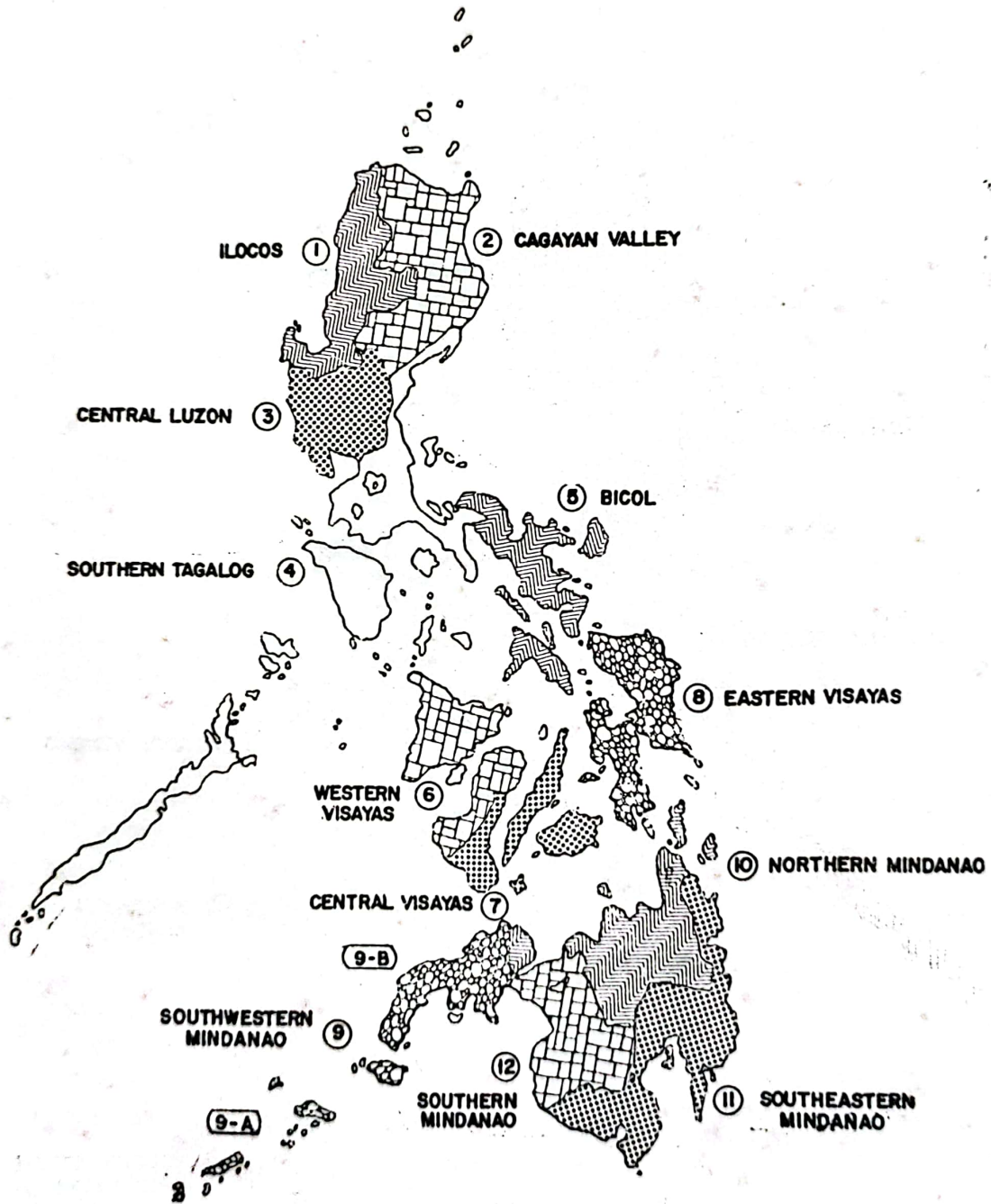


FIGURE 4

for carrying out potential resource development is also a major factor. Cost of the program on the part of national and local government as well as the sharing scheme is very important.

Several kinds of benefits stem from the various purposes of watershed development projects. One major group of benefits is reduction in flood damage to crops, pasture, livestock, roads, bridges, railroads, utilities and urban properties.

Control of surface runoff and flood prevention creates benefits through the prevention of sediments deposition on floodplains, in streams and reservoirs. Change in land use and more intensive use of the land are commonly found where floodplain are given protection. Likewise, restoration of former productivity is possible on lands damaged from sediment deposition. Agricultural water management benefits resulting from irrigation and drainage are the increased net incomes from the areas affected.

Certain other types of benefits such as pollution abatement, stream-flow regulation, ground water recharging, and water for rural and urban communities create direct benefit where such purposes are included in watershed development. There are many indirect and intangible or non-monetary benefits from watershed development. Examples would be the prevention of loss of human life and a reduction in the fear of inhabitants for possible destructive flood.

#### THE POLITICAL REGIONS AND THE WATER RESOURCES REGIONS OF THE PHILIPPINES

In the study of the principal river basins in the Philippines for water resources development, R. C. Bruce divided the country into 12 Water Resources regions which conform and approximates the boundaries set for the 12 political regions. Figures 3 and 4 indicate the discrepancies/conformity between the political regions and the water resources region. The water resources regional breakdown conforms to the watersheds/river basins while the political regions conform with the provincial boundaries. The discrepancies between the two types of regionalization is big particularly in Luzon and Mindanao.

The National Water Resources Council recognizes the 12 Water Resources region and are being used as development unit in their water resources projects.

More than 400 river basins have been identified and studied by R. C. Bruce in terms of physical characteristics of the watershed. In terms of drainage area, there are 15 basins which appropriately fall under the category of river basins:

<i>Name of River</i>	<i>Drainage Area (Sq. Km.)</i>
1. Cagayan River, Luzon .....	25,469
2. Cotabato River, Mindanao .....	23,169
3. Agusan River, Mindanao .....	10,921
4. Pampanga River, Luzon .....	9,759
5. Allah River, Mindanao .....	6,849
6. Pulangi River, Mindanao .....	6,772
7. Agno River, Luzon .....	5,952
8. Abra River, Luzon .....	5,125
9. Magat River, Luzon .....	4,631
10. Chico River, Luzon .....	4,588
11. Ilagan River, Luzon .....	4,464
12. Abulug River, Luzon .....	3,362
13. Tagum River, Mindanao .....	3,064
14. Maridagao River, Mindanao .....	2,037
15. Ilog River, Negros Occidental .....	1,945

Since water development planning has become a part of regional economic development, the watersheds and river basins identified in the Philippines can be used as planning units in regional development programs being developed by the National Economic Development Authority.

#### ACKNOWLEDGMENT

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## ABOUT THE AUTHORS

Dr. Bruce's paper is the second this year in the *Philippine Geographical Journal*. Watershed is well defined in this paper: Watershed as a Planning Unit.

Dr. Bruce got his BS in Agriculture at UP Los Baños, MS Agronomy at University of Illinois and Ph.D Agronomy at University of Hawaii under the East-West Center Grant.

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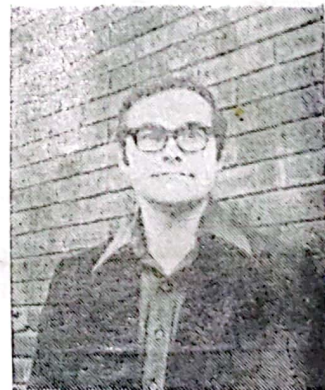
Presently, Dr. Hardstone is Lecturer, Department of Geography, Nanyang University, Singapore. He has occupied this position since November 29, 1975. He has about eleven published papers including the present one in this Journal.

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DR. DON S. BIDDLE, B.A., M. Ed. (Sydney), Ph.D (London), is Vice Principal, Sydney Teachers College, Australia. He has been President of the Geographical Society of New South Wales, the Geography Teachers Association of New South Wales, and the Australian Geography Teachers Association, and is the present Editor of *Geographical Education*. He also has published numerous articles on geographical education and read papers at Conferences in Hong Kong, New Zealand, England, Nigeria and Australia.

LARRY N. GARRETT is at present pursuing his Doctoral Study at George Peabody College. His present paper is under the heading of Geographical Viewpoint because it creates geographical thinking within the context of the five traditions of Geography. We would like to have more of this thinking in order to bring home the broad horizon of geographical education. Mr. and Mrs. Garrett during this summer of 1978 went to Brazil to study a certain kind of palm, its industrial and agricultural uses.



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