

Time allocation studies: A tool in planning and impact analysis of development projects ^{1/}

Lars T. Soeftestad

1 INTRODUCTION

This paper is concerned with local populations living, as well as making a living, in surface water systems of Bangladesh. More specifically, it faces the unavoidable conflict between local populations and centrally initiated often large-scale interventions in their ecosystem. What are the effects of these interventions on the ecosystem and subsequently on these local populations? How can we best ascertain the situation prior to any intervention? How can we monitor the changes while interventions are underway and afterwards? And finally: How to collect data that aids in answering these questions, and what data to collect? This paper presents a specific methodology that, it is argued, will aid in planning, implementation and impact analysis of interventions in surface water systems. Only when due consideration is given to the local populations involved, can an optimal project design be conceived.

The paper consists of four parts. In part I theoretical and methodological issues are presented and discussed. Part II is devoted to a review of studies using this particular methodology, with an emphasis on Bangladesh, while part III presents briefly an ongoing study utilizing the same methodology. The final part VI broadens out to a discussion of the utilisation of this methodology within a broad ecosystemic framework.

2 THEORETICAL AND METHODOLOGICAL CONSIDERATIONS

2.1 Theoretical and conceptual framework

2.1.1 Human behaviour

This paper takes human behaviour as its point of departure. In point of fact, human behaviour in its many-faceted forms and contexts will be in focus throughout. 'Human behaviour' is an extremely wide category that at the outset seems to evade any efforts of definition that makes it an analytical useful and cross-culturally comparable concept. The scientific study of human behaviour within anthropology has to a large extent been of a more or less qualitative nature. Participant observations that emphasises human behaviour in context, has been the hallmark of anthropology.

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While not belittling this long historic tradition, quite to the contrary, this paper proposes that the qualitative study of human behaviour in addition fruitfully can be studied more quantitatively. One of these new emerging quantitative methodologies is already beginning to be known under the catch phrase Time Allocation (TA) - studies.

The question arises here of whether it is possible to study, describe and analyse human behaviour quantitatively in this way. Research within e.g. ecological psychology indicates that it is possible to identify natural behavioural units (Pelto 1978).

Different TA-studies emphasises different types of human behaviour, depending on their theoretical underpinnings and methodological organisation. Many will however concentrate on human behaviour labelled as 'work' or 'labour'. These terms will be given the same meaning in this paper. Broadly speaking, labour covers productive activities, and excludes e.g. play, sleep, idleness, schooling, hygiene, social needs and exchange. As is evident, of the whole range of human behaviour, a fairly small part is considered 'labour' in this context. Khuda (1982) sees 'labour' as consisting of 'directly productive activities' and 'household maintenance activities'. According to Khuda,

Labour necessary for generating income and capital is what is commonly referred to as (directly productive activities), and labour necessary for the maintenance and upkeep of the household which is not directly productive in the sense of generating income or contributing to physical capital information is what is generally known as non-economic or 'household maintenance activities' (Khuda 1982: 6).

In earlier TA-studies often only human behaviour by men engaged in directly productive activities were defined as labour. Recent studies have included also children and women. The whole range of so-called household maintenance activities are now increasingly being seen as labour. On a very general level, 'labour' will be defined as "... the 'human effort' expended in biological 'maintenance'" (Johnson 1978: 86). This definition of labour is difficult to operationalize, and measurement based on it raises practical problems. This is because what we call 'basic needs' depends on culturally specific human activities seen as necessary for maintenance. With anthropology's strong emphasis on cross-cultural comparability, this is not acceptable. The definition mentions 'human effort' however, and it is fairly easy to find a cross-culturally acceptable measure of human effort. Both time and energy can be used (Johnson 1978). This paper presents a methodology utilizing time.

2.1.2 Time

According to the above then, time is an indirect way of measuring human behaviour. But it leaves open actually what time is. There is a wide cross-cultural variation here (see e.g. Evans Pritchard 1940, Latif and Spencer 1981, Malinowski 1935). In the West time is conceptualized as something that can be counted in seconds, minutes and hours. It is this western idea of time that lies behind the appeal of TA-studies. This concept of time is therefore a potential imposition on the values and norms of other cultures (Pedersen 1982).

TA-studies are concerned with human behaviour, but not simply isolated, descriptive action. We must be wary of any tendency of reductionism. The ideal then is human behaviour in social context, and this context will most, often as well as minimally, be the household.

The household is basically invested with the functions of production, reproduction and consumption. All members pool the resources at their disposal. Because these resources, both human and material, are always in short supply, the household is faced with perpetual problems of decision-making and dilemmas over the allocation of these resources. One of these resources is time. The day has only 24 hours, and time is thus an important constraint on human behaviour. In this context time is defined as the allocation of a scarce resource to alternative ends.

2.1.3 TA-studies

The object of TA-studies is the allocation of time, and the units of study are usually individuals as members of specific households. TA-studies are defined here as mapping of human behaviour over time.

2.2 Methodology

2.2.1 Classification of behaviour

The definition of behavioural units, and subsequently classification of observed behaviour, poses serious theoretical and methodological problems. Children's work liberates adult work, but is children's work really work (Nag, White and Peet 1980)? What about behaviour done consecutively? How do we classify the same behaviour when it takes place in different social contexts? Where does one type of behaviour end and another begin? These are some of the several thorny issues that the TA-researcher has to come to grips with. There are no easy answers. Moreover, since each research situation is unique, the researcher will have to tackle these problems within the context of her or his own project. The rule of thumb seems to be that whatever choices one makes, stick to them throughout the study, and in the analysis assess the limitations these choices puts on the predictability of the conclusions drawn.

2.2.2 Dimensions of behaviour

The following dimensions are potentially important when mapping behaviour in time, depending on the aim of the study (see Table 1). Some of these dimensions are difficult or impossible to code, and should rather be seen as qualitative data that have to be used in conjunction with TA-data.

Table 1: Dimensions of behaviour

Dimensions	Specification
(a) Content	Description of the actual observed behaviour
(b) Length	Time used for each behaviour unit
(c) Sequence	No. of behaviour units per time unit
(d) Organization	Succession of physical events. Organization of behaviour in time
(e) Context	Organization of behaviour in space

2.2.3 Methods

Overview

There are a number of different TA-methods available, tailored to specific data needs or characteristics of the culture and population in question (see Table 2).

Table 2: Overview of TA-methods

Main category	Sub-category / Description
(a) Observational methods	1 Continuous observational methods
	2 Random visits / spot check methods
	3 Fixed interval methods
(b) Self-reporting methods	4 Recall methods
	5 Diary methods
(c) Indirect methods	6 Based on transformation of production data to TA data

Continuous observation

In this method the units of study are being continuously observed throughout the study period. It is mainly used within controlled experiment situations in e.g. sociology and psychology (Gross 1984a). As a natural observation method it was previously used to some extent within both economy and the social sciences including anthropology (Lewis 1951, Richards 1939). The method is very taxing on resources (see e.g. Choudhury 1983, Khuda 1982), and is usually restricted to observation periods of fairly short duration.

Random visits or spot-checks

The basic limitation of the above method, i.e. resource inputs, is solved by random sampling of the behaviour stream in space and time (Gross 1984a, Johnson 1975, 1978). Selected units of study are being observed at selected days on selected times of the day. The idea is to observe the units behaviour at one particular point in time, ideally "... the instance before (the units of study become) aware of the ethnographer's presence" (Johnson 1975: 303).

Fixed interval

This is basically a combination of continuous observation and random visits (Gross 1984a). The cost-effectiveness of random visits is combined with the ideal of studying behaviour as it unfolds over a certain time-period. The methodology of random visits is used, but instead of making only spot-checks, an observation period of e.g. 15 minutes is used each time. The problem of coding additional information available as in continuous observation is here present.

Recall methods

This involves post-facto descriptions of time used by means of interviews. Respondents are most commonly asked to detail what they did during the 24 hours of the previous day (Cain 1980, Farouk and Ali 1977, Gross 1984a, Whyte 1977).

Diary method

Respondents are asked to keep diaries of their activities. There are several variations of this method (Brookover and Back 1966, Gross 1984a, Whyte 1977). Since the method requires literate respondents, its usefulness is restricted.

Transformation of production data to TA-data

This method requires the existence of reliable production data (Gross 1984a; Gross and Underwood 1971). It is not used much.

2.2.4 Methodological problems

The basic methodological problem is variance caused by sampling of persons, and, in the case of random visits, by sampling of times. This is however not a special problem with this methodology nor indeed in anthropology.

2.2.5 TA-studies: An appreciation

There are criticisms against TA-studies, to be sure. They are however mostly implicit to the argument, and take the form of a cautious warning against an over-reliance on the predictability of TA-data as such, apart from the social context that this behaviour is enmeshed in. There is a potential danger of reductionism that has to be countered. Rotenberg (1981) argues against the use of TA-data to test hypotheses on time used cross-culturally. The information content in TA-data may well be reduced. In the analysis TA-data have to be combined with other qualitative data, they have to be recontextualised. TA-studies are not the first methodology in the social sciences to produce quantitative, measurable data. Its virtue lies in the fact that it combines the time-honoured anthropological method of participant observation with producing quantitative data of high reliability and validity. Ideally, data of time used are observed, classified, and recorded on the spot. The fact that allocation of time is a universal occurrence makes TA-data multipurpose and versatile in their application. TA-studies can be designed to cover not only male productive activities as is usual in e.g. studies on peasant agricultural production. Data on time use of all household members gives important insights into the often crucial importance of women and children in the upkeep of the household. There is an increasing interest within anthropology for applied research with an emphasis on hypothesis-testing, what has been called 'problem-solving anthropology'. TA-data lend itself well to application in this new emphasis. At this point it is instructive to quote one reviewer at some length:

... advantages are reaped from measurement only where variables have been satisfactorily operationalized... The validity of operationalization depends, of course, on the question asked and must be addressed in the context of a specific ethnographic situation. Clearly, quantitative measurement can never entirely replace sensitive ethnographic descriptions... Systematic quantification beyond the nominal level has substantial advantages...; it increases the reliability and comparability of cross-cultural research; it preserves negative cases and undermines the subconscious quest for patterns; it exposes intra-cultural diversity; and it permits statistical rigor, thus facilitating theoretical precision (Mulder and Caro 1985: 324).

TA-data, as well as a host of other quantitative data, has for long been collected by survey methods based on respondent recall, i.e. self-reporting methods. This reliance on the respondents' memory may often turn out to produce distorted data. Human memory is often notorious in reproducing the past inaccurately (Bernard 1984). Furthermore, it has long been accepted in anthropology that what people do, what they say they do, and what they think about what they do, often does not correspond neatly (Barth 1966, Firth 1951, Malinowski 1961). Observational TA-methods go a long way towards solving this problem by recording people's behaviour and time use as it occurs.

3 REVIEW OF LITERATURE ON TA-STUDIES WITH SPECIAL REFERENCE TO BANGLADESH

TA-studies have long been of interest and the methodology is still emerging. As it is being applied to new field settings and new areas of research, its theory and methodology is continuously being developed. A measure of the degree of maturity it has reached, is the increasing number of published evaluations and reviews (see e.g. Bartlett 1980, Gross 1984a,

Johnson 1978, Minge-Kalman 1977, Minge-Klevana 1980, Mulder and Caro 1985, Rotenberg 1981, Whyte 1977). This part will briefly outline development of this methodology within selected field of enquiry and refer to internationally important studies, before going on to detail the use of TA-studies in Bangladesh.

3.1 TA-studies: An international review

The emphasis will here be on the developments within the disciplines of anthropology and economy. Under different guises, TA-studies have been used within anthropology for a long time. From the 20'ies onwards continuous observation or recall methods were used to record the 'daily/weekly round of activities'. Malinowski (1935) provided a map of time reckoning from the native's point of view, while Evans-Pritchard (1940) distinguished between 'oecological time' and 'structural time'. In an early and influential study, Richards (1939) estimated labour costs through continuous observation. Later, Erasmus (1939) estimated (1955) devised a method for random observations that became something of a breakthrough. A modern approach to behaviour sampling was developed by Johnson in the early 70'ies (1975).

In a seminal paper, Becker (1965) emphasised the value of time at the household level. The paper instigated the so-called 'New Household Economics' within the field of economics. Many of the goods identified in this production system can not be expressed in monetary terms, and time is used as an indirect way of measuring inputs and outputs. This microeconomic approach has stimulated a large number of multi-purpose household level surveys, most notably the Laguna Household Survey on the Philippines (see Evenson et. al. 1980).

3.2 TA-studies in Bangladesh

TA-studies have been used in Bangladesh since around the middle of the 70'ies. The relatively few studies that have been done so far have their theoretical foundation in anthropology, demography and economics broadly speaking.^{2/} Some of the studies are revised and republished versions of each other. The studies use different TA-methodologies, mostly recall methods. For this reason they are unfortunately not easily comparable. This is further complicated by the fact that the studies are conceptualized within different theoretical frameworks and have different aims. The so-called "New Household Economics" referred to above has to some extent influenced the studies done within economics. The studies focus on one or more of the following three main issues: (1) employment/underemployment research, (2) the importance of household maintenance activities for understanding household production and reproduction and (3) children's importance for the viability of the household. None of the studies can be said to have an explicit applied developmental goal. The propositions and hypotheses put forward are largely consistent with each other, and are increasingly being confirmed by other studies utilizing a cross-cultural framework. This part will review the major TA-studies done in Bangladesh, emphasising methodological design and issues, as well as findings.

Cain, Mead T.

Cain did a study around 1976 in a village in north-central Bangladesh, near the east bank of the Brahmaputra. The study focused primarily on the type of demographic behaviour characterized by high fertility and large numbers of surviving children. The basic question was whether this behaviour was economically rational or not from the perspective of the viability of the household. As an adjunct to this, he also focused on household maintenance activities, arguing that these are "... 'enabling' labour..." (1980: 221), in the sense of freeing other household

^{2/} The full list of studies, published and unpublished, include: Cain (1977a, 1977b, 1980), Chaudhury (1982, 1984), Choudhury (1983), Farouk (1976, 1979, 1980), Farouk and Ali (1977), Khuda (1977, 1978, 1979a, 1979b, 1980a, 1980b, 1982), Rahman (1986).

members to participate in directly productive activities. Through participant observation Cain collected qualitative data that bear upon these research questions. The main bulk of data analysed in the publications reviewed for the present paper are however data on time use.

To illustrate the extent of, as well as time-consuming nature of, household maintenance activities, Cain analysed the time allocation of a single-person household throughout two days. The data were collected by recall and are visually presented in a table (1980: 223). The table gives a clear picture of the manifold and onerous tasks connected with household maintenance activities.

In order to check the main proposition, time budgets using a more sophisticated recall design were used. Data were collected from the main sample of parents and their children aged 4 years or older. Each household was visited twice a month during the period mid-October to mid-December. Respondents were asked to reconstruct activities and their length during the preceding 24 hours. The time budgets were collected by educated local villagers. A more detailed description of the methodology is available (see 1977a). Cain warns that the data are preliminary in two respects: Firstly, they are taken from the beginning of the study when methodology was still evolving, and secondly, they cover only two months and therefore do not take account of seasonal variations. Cain summarizes:

Children of both sexes work long hours at early ages. Children aged 4-6 years work approximately one fifth as long as adults. Their work time increases to one-half an adult work day by ages 7-9, to three quarters by ages 10-12, and at age 13 and above children work, on average, as long as or longer than adults (1980: 237).

Based on additional measurements of relative productivity and labour efficiency, Cain concludes that:

Children of both sexes begin to work and put in long hours of work at young ages. Male children appear to become net producers at least by age 12, compensate for their cumulative consumption by age 15, and compensate for their own and one sister's cumulative consumption by age 22. Male children, in particular may represent a means of supplementing income and accumulating economic wealth within their parents' lifetime (1980: 246).

The analysis of the available data leads Cain to conclude that "... high fertility and large numbers of surviving children are economically 'rational' propositions" (1980: 246).

The quantitative TA-data analysed are based on recall methods. Whereas there in one case was random sampling in space, i.e. of households, no random sampling in time was used. A fixed interval of 15 days is far from random. Data were not collected for persons in the age group 0-4. The fact that data were collected for several months (although data for only two months were available for the present analysis), is an improvement upon earlier studies. The strength of the analysis rests upon the qualitative data that the TA-data are interwoven with.

Choudhury, Fazlul Karim

Choudhury, an economist, did a study involving extensive collection of TA-data in 1979-80. The study site was a village in Sylhet. Data on time use were collected every 15th day from all persons aged 4 years and above in 108 households. The methodology used was recall of activities during the preceding 24 hours. In addition field investigators collected dietary intake data for all members in the sample households once every month. A part of the study formed the basis for a PhD thesis (Choudhury 1983). Choudhury has so far not utilized the rich store of data for further publications.

Rafiqul Huda Choudhury has however had access to the material. He has published two papers based on the data, mainly addressing aspects of nutrition (Choudhury 1982, 1984).

Farouk, Abdullah

In the period 1973-75 a fairly large-scale investigation into time use was carried out by Farouk and associates (Farouk and Ali 1977). For papers summarising the study or parts of it, see Farouk (1976, 1980).

The study is "... primarily an attempt to estimate with empirical data, how and individual in Bangladesh spends his 24 hours of the day on an average" (1977: 8). Secondary goals were to relate time use to income and living standard, and to compare these relationships with those in a developed country.

Being conceived within economics, the different uses of time is defined accordingly. This terminology witnesses this:

Time use has been treated here as an accounting unit and not as a value increase unit, particularly because of the problem of non-market output... But the classification has been made keeping in view, the socio-cultural realities of our life (1977: 8).

Based on pre-established criteria, 7 Unions over the whole country were selected, thus covering a wide range of variations. A random sample of 100 households was drawn from each union. Although the household was the unit of study, most of the data on time use refer to the household head. Additional data were collected from other household members 18 years of age or older. Each household was visited once, and the household head was asked among other things to detail what he did during the 24 hours of the preceding day. A detailed description of the methodology is contained in Farouk and Ali (1977).

The importance of this study possibly lies in its comparison of time use between people engaged in different production regimes, in urban and rural areas, and under different physical and geographical circumstances. In order to facilitate this, data are to a large extent aggregated to the Union level.

Findings include:

1. For men, "The more modernized the production techniques used, shorter is the total time spent by a person in productive work" (1980: 181). The term 'productive work' roughly corresponds to the sum of 'directly productive activities' and 'household maintenance activities',
2. For men, "agriculture is primarily the source of self-employed earning in the countryside, and each earning has primary importance only in the urban areas" (1980: 181),
3. For men, "It seems that family expenditure saving work... is largely a non-rural phenomenon and associated with modernisation" (1980: 181). 'Family expenditure saving work' roughly correspond to 'household maintenance activities',
4. For men, "The amount of time spent by a respondent on study and training is extremely low throughout the country and almost totally absent in all rural areas..." (1980: 183),
5. For women, "...productive hours of work vary between ten and about fourteen hours. This is considerably more than the productive work-hours of men..." (1980: 183),
6. For women, "...cash earning ...is an exception rather than the rule..." (1980: 183),
7. For women, "The most important use of time... seems to be work done in the household, either in the kitchen or in expenditure saving household work" (1980: 183), and
8. "Women work more on expenditure saving work and spend less time in personal care and mid-work rest... Women also have less recreation of a formal kind than is true of their husbands" (1980: 183).

This study is well presented and documented; the detailed data provided on methodology is especially commendable. The basic methodology used relies on recall, which makes one question the validity of the data.

Moreover, this is an extreme example of an extensive study design with data for only one day from each household. Time use categories are heavily influenced from economics, and do not facilitate comparison with other studies in Bangladesh easily. Examples are inclusion of 'study and training' with 'productive work', and the category 'unused time'. Treatment of women's and children's time use is inadequate. Comparison between the seven unions seems difficult since data were compiled at different points in time, and no provisions has been made for taking seasonal variations into account. The 1974-famine makes one suspect the representativity of the data. Lastly, it is not possible to assess the international comparison presented since no further data on the US-study used is presented.

In 1977-78 Farouk and associates undertook a comparative study of women in six villages spread over the whole country (Farouk 1979). Some of the objects were: 1) a need for defining women's economic functions more clearly, 2) how the pattern of time use among women is changing, and 3) the role of women in decision making within the household. From each village, 100 households were selected based on stratified random sampling from three income groups. Female investigators from the research villages did the actual fieldwork. The TA-methodology used seems to be basically the same as the one used in the above study (see Farouk and Ali 1977). Women were asked to describe detailed how they had spent the 24 hours of the preceding day. Findings seem to corroborate those from similar studies.

Khuda, Barkat-E-

From a background of demography, Khuda in 1976 collected data in a village in Comilla (1982). All references in the bibliography except 1980b are based on data from this field study. Based on a novel concept of village level investigations within the field of demography, the study aims at a detailed analysis of the pattern of labour utilisation. Further aims were a test of various conventional approaches and definitions generally employed in the measurement of labour force in rural agrarian societies.

To this end, Khuda designed as schedule of surveys: Household Census, Labour Force Survey, Labour Utilisation Survey, Value of Children Survey and Time Budget Study. Emphasis in this context will be on the Time Budget Study. Of the total number of households, 34 (i.e. approximately 11%) were selected based on stratified random sampling with proportional allocation to the size of four pre-established strata based on cultivable land of each household. The method used for collecting data on time use was continuous observation of the members of each sample household each day from early morning until night throughout 210 days. Interviewing was used to some extent. Time use was classified in several main broad categories: 'Directly Productive Activities', 'Household Maintenance Activities', 'Personal Care and Needs', 'Studying', 'Playing', 'Social Needs' and 'Idleness'. Data were collected on all persons aged 5 years and above. Salient features of the methodology are presented in Khuda (1982), while an exhaustive discussion of methodology is contained in Khuda (1978).

Findings based on the Time Budget Study include:

1. Time spent on directly productive activities is functionally related to age and sex. Males spend more than twice as much time on directly productive activities as females,
2. Owner-cultivators-cum-sharecroppers spend more time on directly productive activities than all other occupational groups,
3. Marital and maternal status of women does not influence their participation in directly productive activities,

4. Adults and children contribute substantial amounts of time to household maintenance activities,
5. Females' inputs into directly productive activities and household maintenance activities are higher than that of males,
6. in the context of village labour utilisation surveys, the study point out the seasonality of work, the limitations of conventional approaches to the measurement of labour force and its utilization, the importance of women's and children's work within the household context, and the conditions of stable high fertility,
7. The study recommends the use of TA-studies in order to collect data on the pattern of labour utilisation in rural agrarian societies, and
8. The study advocates a redefinition of 'work' in the context of rural agrarian societies to include household maintenance activities.

This study is noteworthy for the micro-level methodological approach selected to answer macro-level questions on labour-utilisation. At the same time the set of surveys used enable crosschecking of data. It is furthermore interesting that the study has turned away from the usual pattern of collecting TA-data by means of recall methodologies. The inclusion of all persons aged 5 years or older is also positive. However in order to get representative data on time use, also children below 5 years should have been included. I am struck by a seemingly lack of more qualitative data to be analysed in conjunction with the survey data. As for the overall design, I have two comments. Firstly, the large input on manpower necessary to execute this study together with the choice of methodologies, to my mind seems to be an intrusion on the privacy of the village and the sample households that potentially could have affected the quality of data. Secondly, the design is extremely intensive. TA-studies need not be designed in this way, demanding large inputs of human material resources, in order to give data of good quality. In other words, continuous observation over long periods is not necessary. Behaviour sampling based on 'random visits/spot checks' or 'fixed interval', given random sampling in space and time, will yield reliable results.

Rahman, Rushida I.

Rahman is currently using TA-methodologies in studying women's time use. In a recently published paper (1986), she deals with methodological issues connected with use of recall methods to study time use connected with child care. The study uses recall methods focused on use of time during the 24 hours of the preceding day. Data are still being processed and analysed.

4 INLAND CAPTURE FISHERIES AND TA-STUDIES

As part of an ongoing anthropological field study of human adaptation to the *haors* area in Sylhet, I have been using TA-methodology. This part (1) presents the study area, (2) places this methodology within the context of the field study, (3) details the methodology, (4) specifies some of the preliminary findings, and (5) evaluates the usefulness of this methodology so far.

4.1 The study area

The field is located in the north-eastern part of the *haors* area proper. *Haor* is a local term for a depression where water is retained throughout the year. During the monsoon (June-November) the whole region is virtually submerged. In the winter and spring (November-May) numerous rivers and channels drain off excess water, while these small and more often very huge *haors*

spread over the whole region retain water. *Haors* are important spawning and feeding grounds for numerous species of fish, and are the focus of rich fisheries especially in the winter season. The *haors* also provide water for irrigating the economically very important local *boro* rice crop grown in the winter season. The study focus on ‘capture fisheries’ as opposed to ‘culture fisheries’ (Govt. of Bangladesh 1985b). More specifically, the study focuses on *Dekhar Haor* and the *Moha Singh River* which drains this *haor* (see Annex 1, Map 1). Around *Dekhar Haor*, as well as along *Moha Singh River*, there are a number of villages (see Annex 1, Map 2). Fishermen living in selected villages in this area are taking part in the present study.

4.2 The framework

The study aims at 1) a general description of the way of life of fisheries households in a certain area of the *haors*, and 2) based on this, an analysis of their adaptation to the environment or the way they make a living. For analytical purposes, the study area has been delineated into a ‘social system’ and an ‘ecological system’ (Burnham and Ellen 1979). The household is used as the basic unit of study (Jansen 1983, White 1980). In a situation of large scale changes both in the *haors* ecosystem (Govt. of Bangladesh 1985a), and the *haors* socio-cultural system (Govt. of Bangladesh 1986a), the study focus on the short term and long term changes in employment opportunities and occupational mobility, and the rational behind strategies followed by fisheries households in this context. In an applied context, the study’s thesis is that the present planned as well as unplanned, external interventions into the *haors* ecosystem, have a serious overall detrimental impact on the fisheries sector. The applied aim of the study is to argue for a regional planning approach that takes the fisheries sector into consideration in order to arrive at an optimal solution benefiting all local populations.

Based on the above, some important questions pertaining to the current development situation in the capture fisheries sector in the *haors* surface water system raise themselves: What is the time input into fishing and related tasks throughout the various seasons? What is the contribution of women and children to directly productive activities, including fisheries? What is the importance of alternative occupations throughout the various seasons?

4.3 TA-studies

The TA-data were collected in a small *para*, i.e. hamlet, of a larger village situated along a part of the *River Surma* that constitutes the western perimeter of *Dekhar Haor* (see Annex 1, Map 1). The *para* is inhabited by 68 Hindu households belonging to various casts. Non-fishing households were not considered as relevant for collection of TA-data. The remaining 45 households were divided in four socio-economic groups based on among other things the total consumption of rice, adapting Schendel’s criteria (1982: 89-92). The final sample of 15 households and 74 persons were drawn on the basis of stratified random sampling with proportional allocation to the size of the strata.

Because of the inherent problems with reliability and validity of recall methods, and as a natural consequence of the strong emphasis on participant observation in anthropology, I decided to use the ‘random visit’-variant of TA-studies. The sampling procedure consisted of the following three steps:

1. *Days (sampling in time)*. I decided that on the average I wanted to collect data on time allocation every second day of the time remaining in the field. Random sampling gave a schedule for which days to collect data,
2. *Times of the day (sampling in time)*. I decided that I wanted to study allocation of time for households six times of each of the days selected under paragraph 1. The time from 7 AM to 7 PM was divided in one-hour intervals. For each day selected under paragraph 1, six times between 7 AM and 7 PM was randomly selected, and

3. *Households (sampling in space)*. For each of the six times of the day selected under paragraph 2, I selected one household. For each day, six households were accordingly drawn randomly from the total list of 15 households. Each household could be drawn only once each day, but could be drawn on two consecutive days.

This sampling procedure resulted in a detailed schedule that for each day selected, specified which household to visit at what time.

A codebook containing approximately 130 behaviour codes, in the form of three-letter acronyms, was made. The main categories are basically the same as those used by Khuda (1982) in order to facilitate comparison. The codes emphasise the following characteristics of households that were considered important for the present study: production and exchange. Descriptions of observed behaviour were written in longhand on special code sheets and were coded each night. Behaviour was noted for all members of each sample household.

4.4 Findings

The field study is still in progress. The findings reported here based on the TA-study, are accordingly tentative and may have to be revised at a later stage (see Tables 3 and 4).

Tables 3 and 4 presents the time use in hours per day by main activities for broad age groups of females and males respectively. Data were cross-tabulated manually. Time use for each age group summarizes to 12 hours since observations were done between 7 AM and 7 PM. Both girls and boys participate in Directly Productive Activities from an early age. Likewise it is noticeable how boys early get heavily involved in Directly Productive Activities, while girls concentrate on Household Maintenance Activities. In their early teens, boys' input into Directly Productive Activities totals close to 3 hours daily, while girls in the same age group invest almost 4 hours daily into Household Maintenance Activities. It is noteworthy that the combined work input into Directly Productive Activities and Household Maintenance Activities in all age groups are higher for females than for males. Males compensate for this in other areas: (1) As they get older they use more time for Personal Care and Needs, while women in the same age group still put in long hours into Household Maintenance Activities, (2) in all age groups males use more time for Idleness and Leisure than females, and (3) females hardly use any time at all for Other or Unspecified Activities, while males on the average use almost 1 hr each day for such activities. For females all time listed under Exchange implies visits to or from neighbours or relatives. For males, Exchange in addition also includes more formal or informal meetings or discussions connected with management of the household and/or village politics. Very few boys, and no girls, attend schools.

Table 3: Time use by main activities for broad age groups of females (hours/day)

Activity	0-4	5-9	10-14	15-24	25-34	35-44	45+	0+
Directly productive activities	0	0.4	1.5	0.3	0	0	0.6	0.3
Household maintenance activities	5.3	2.1	3.8	6.7	6.2	5.8	6.3	5.0
Personal care and needs	0.4	0.8	1.5	3.0	1.0	2.2	1.9	1.4
Studying	0	0	0	0	0	0	0	0
Playing	3.0	5.0	3.8	0	0	0	0	0
Exchange	3.0	3.2	0.7	1.0	3.6	1.3	1.9	2.5
Idleness and leisure	0.4	0.2	0.7	1.0	1.2	1.3	1.3	0.8
Other and unspecified activities	0	0.4	0	0	0	1.3	0	0.2
Total hours	12.1	12.1	12.0	12.0	12.0	11.9	12.0	12.1
No. of persons	4	10	2	5	10	4	4	39
Person days	32	63	16	36	60	27	19	253

Notes: (1) N = 39, (2) total n no. of observations = 235, (3) observation period: 1 June - 1 July 1986, (4) totals do not add to 12 hours due to rounding.

Table 4: Time use by main activities for broad age groups of males (hours/day)

Activity	0-4	5-9	10-14	15-24	25-34	35-44	45+	0+
Directly productive activities	0	1.0	2.6	4.6	3.5	3.6	1.1	2.4
Household maintenance activities	5.2	1.4	0.9	1.7	1.1	2.0	1.7	2.0
Personal care and needs	1.0	0.7	0.9	0.6	1.8	1.3	4.6	1.4
Studying	0	0.5	0	0	0	0	0	0.1
Playing	2.6	5.5	5.1	0	0	0	0	2.0
Exchange	2.6	1.9	0.7	1.7	1.4	2.0	1.1	1.7
Idleness and leisure	0.5	0.7	0.7	1.1	3.2	1.3	2.3	1.5
Other and unspecified activities	0	0.2	0.9	2.3	1.1	1.8	1.1	1.0
Total hours	11.9	11.9	12.1	12.0	12.1	12.0	11.9	12.1
No. of persons	4	8	2	4	60	8	3	35
Person days	23	50	14	21	34	47	21	210

Notes: (1) N = 35, (2) total n no. of observations = 210, (3) observation period: 1 June - 1 July 1986, (4) totals do not add to 12 hours due to rounding.

Table 5 narrows in on Directly Productive Activities and Household Maintenance Activities, and presents time use for the first level of sub-activity codes. The table underlines the strong division of work among the sexes. For males, more than half the time used for Directly Productive Activities is used in Fishing. The rest are shared between Agriculture, Wage Labour and Service, and Husbandry. Women use almost 2 hours each day for the onerous tasks of food preparation and cooking, and 2.5 hours for maintenance of the homestead and care of children.

Table 5: Time use by the first level of sub-activities within Directly Productive Activities (DPA) and Household Maintenance Activities (HMA) for females and males (hours/day)

	Activity	Females	Males
DPA	1 Fishing	0	1.2
	2 Agriculture	0	0.3
	3 Wage labour and services	0.2	0.1
	4 Husbandry	0	0.2
	5 Gathering and hunting	*	*
	6 Manufacture and maintenance	*	0.2
	7 Sale of household produce	0	*
	8 Other and unspecified activities	0	*
	Total hours	0.2	2.0
	No. of persons	39	35
	Person days	6	41
HMA	9 Food	1.5	0
	10 Homestead	1.2	0.4
	11 Children	1.4	0.6
	12 Cloths	0	0
	13 Marketing and errands	0	0.4
	14 Illness	0.6	0.6
	15 Collecting firewood	*	0.1
	16 Fetching water	0.2	0
	17 Other and unspecified activities	0.1	0
	Total hours	5.0	2.1
	No. of persons	39	35
	Person days	104	34

Notes: (1) N = 74, (2) total no. of observations = 185, (3) observation period: 1 June - 1 July 1986, (4) * = non-significant value, (5) the values for DPA on women are uncertain due to the small no. of observations.

Table 5 narrows in on Directly Productive Activities and Household Maintenance Activities, and presents time use for the first level of sub-activity codes. The table underlines the strong division of work among the sexes. For males, more than half the time used for Directly Productive Activities is used in Fishing. The rest are shared between Agriculture, Wage Labour and Service, and Husbandry. Women use almost 2 hours each day for the onerous tasks of food preparation and cooking, and 2.5 hours for maintenance of the homestead and care of children.

A comparison with Kuda (1982) is interesting. He presents average numbers of hours spent on Directly Productive Activities by age and sex (1982: 111). Comparison of figures for the slack season shows similarities for the younger age groups both for females and males. Values for the older age groups are generally quite different with Khuda's values being larger. The values for females show larger disparities than those for males.

4.5 Evaluation

The TA-data analysed for this paper were collected around June 1986. The total number of observations is 463.

TA-data from less than five weeks are not enough to make generalizations covering the whole year. There are important seasonal changes in these fishermen's activities that are missing if TA-data are not collected both during the monsoon season and the winter season.

The number of observations per time unit is not large. On the other hand the sample and the number of persons observed are also small. With the design outlined above, each household were visited on the average every 2 to 3 days. With strict randomness in all sampling procedures, this density of observation is fully acceptable. The total number of observations is however too small to make more detailed analysis e.g. with reference to socio-economic groups. For the same reason some of the higher age groups had to be coalesced.

June 1986 turned out to be a rather special month. Due to extremely little rainfall in the Kashia-Jainthia Hills and on the plains, the water level in the river was 2 to 3 meters below normal. Fishermen naturally deplored this situation since it meant that catches were far below average. Time used for fishing were accordingly very little for the time of the year, although June-July in any case is a quiet month. Male members of the household would often be away when visits were made. In such cases respondents sometimes did not know where they were and what they were doing. Efforts were made to come back later the same day and ask. If this did not help, this behaviour was classified as Unspecified Activities. This partly explains the relatively large input of time use into Other and Unspecified Activities for males commented upon earlier. Such activities were most likely Household Maintenance Activities or Exchange.

The main activity category Exchange deserves special mentioning. Defining Exchange as any transfer of material or immaterial resources including information between two or more units, this category makes it possible to arrive at a quantitative expression of various aspects of the exchanges between households. Dimensions of exchange include: (1) content, (2) direction, (3) duration, (4) frequency and (5) quantity. The quantification of certain of these dimensions necessitates the administration of a special interview schedule parallel with the TA-schedule.

At this preliminary stage no effort has been made to deal with the important issue of activities that are performed simultaneously, e.g. a woman feeding her child while cooking. The methodology is still evolving, and this and other issues will be dealt with in the future.

4.6 Conclusions

Methodological conclusions

1. TA-data collected by means of the methodology outlined above, gives a more detailed and correct picture of these fishermen's time use than conventional recall methods would have done,
2. TA-studies are not necessarily labour-intensive. The schedule presented above took around 4 hours every second day, i.e. around 15 hours per week,
3. Other data can be collected at the same time with the same high reliability and representativity,

4. TA-data increase the reliability and validity of other data sets or data types based on recall,
5. The 'random visits' variant of TA-studies is new in Bangladesh. It compares well with other versions in terms of resource inputs and cost-effectiveness,
6. The household is the basic unit of study,
7. The use of the household as the sampling unit ensures that otherwise 'invisible behaviour' will be revealed,
8. TA-studies are especially suitable for studying the productive aspects of household organisation and management. It is also useful for studying various types of exchanges between households,
9. TA-studies gives quantitative expression of relations that otherwise are hard to come by,
10. Self-reporting TA-methods are biased as a whole in that they emphasize 'events' over 'non-events'. This is because discrete acts are easier to count. A record of no activity can however be potentially interesting,
11. TA-data can be of really formidable value in cases where two sets of data, collected some time apart, exist (see Foster 1979),
12. TA-studies are extremely useful in ensuring that researchers do not introduce biases through non-random observations,
13. TA-studies are not a fantastic new methodological aid that renders other more qualitative methodologies superfluous,
14. There is an inherent danger to over-quantify when one use this methodology, and
15. Women from their teens upwards are generally not very visible. This makes observation of their activities difficult for male researchers, and introduces an element of uncertainty since their activities often have to be reported upon by other family members or neighbours.

Factual conclusions

The TA-data presented and analysed here, covers too short a time period to answer the research questions definitively. Some tentative conclusions can however be given at this point, to some extent relying on other more qualitative data-types:

1. Fishermen put in long hours in fishing throughout the year. The monsoon is a slack season, while the winter is a busy season,
2. Girl's contribution to Directly Productive Activities is very little, while boys contribute significantly, especially to fishing,
3. The importance of other occupations throughout the year is little. Major exceptions are participation in the *aman* and *boro* agricultural operations, mainly as wage labourers or daily labourers,
4. The general pattern outlined above applies to the research population, i.e. Hindu fisheries households. For Muslim fisheries households there are differences, but no TA-data on this are available,
5. The TA-study establishes the situation as it is today concerning e.g. the households' labour utilisation. Used in conjunction with other more qualitative data types, it is possible to trace a temporal development,

6. The last two decades have witnessed a steadily decreasing fisheries resource base, together with an ever increasing influx of landless Muslims taking up fishing as a profession. Other large scale interventions include siltation of *haors*, artificial draining for agricultural purposes, seepage of insecticides into surface water systems and building of submersible embankments to protect the *boro* crop,
7. In addition, the previously open-access fisheries in the area have now to a large extent become limited-access fisheries. Fishermen have to pay high fees to local *mohajans* for fishing in rivers and *haors* for a few months each year,
8. The result of the above outlined increasing competition and restriction is marginalisation of the participants. There is a recent tendency for fishermen to work as wage labourers within the fisheries and agricultural sectors while they earlier would be self-employed, and
9. However, no matter how low the marginal productivity become, fishermen stay on. The situation right now seems therefore to be characterized by increasing pauperisation, seasonal unemployment and underemployment.

5 PROBLEMS, ISSUES AND RECOMMENDATIONS

The study in the *haors* area briefly referred to above, is partly an effort to trace post-factum the consequences on the human factor involved in interventions in surface water systems. Since interventions are going on, the methodological package used, and especially TA-studies, may be seen also as a monitoring device. Based on the material presented above, some more general conclusions as to the applicability of TA-studies under various field-and research-conditions are drawn. This part will point out types of TA-studies suited to specific research problems and applied goals. The argument as well as the final model presented will be placed within the framework of what has been called 'ecosystemic research'.

5.1 The framework

Ecosystemic research is situated in a theoretical and methodological framework consisting of:

1. *Ecological anthropology*. This field of anthropology can be defined as the relations among on the one hand social organisation, population dynamics and culture of human populations; and on the other hand the environment in which they live. There is accordingly a focus on systems of production as the link between the above factors. Cultural ecology as conceived by Steward (1955) was concerned with the causal connection between social structure and modes of subsistence. Processes of resource utilization were central to the argument. Processes of resource utilization were central to the argument. The research method paid careful attention to empirical detail in linking cognized environment, social organisation and behavioural expression of human resource use. The field of human/environment interactions was thus greatly delimited. Critique of the above paradigm led to a more explicitly biological orientation. In this new and still developing approach, system theory is seen as providing a broad framework that is essentially qualitative and descriptive. This framework emphasises the internal dynamics of systems, how they develop and change (see e.g. Bennett 1976, Moran 1982),
2. *The ecosystem concept*. A system will be defined as "... a regularly interacting or interdependent group of items forming a unified whole" (Odum 1975: 4). An ecosystem is seen here as a bio-behavioural framework for constructing and testing hypotheses. There are several problems with the use of the ecosystem concept that has to be

countered (Moran 1984). As an overall assessment, the ecosystem concept is seen as: (1) a heuristic tool in conceptualising the unity of physical and biological systems, (2) promoting detailed quantitative data on a broad array of systems components and relationships, and (3) a framework within which to test hypotheses on the relationship between people and the physical environment (Gross 1984b), and

3. *Quantitative methodology*. There is an increasing need for more and better measurements in the field to investigate inter-relations among variables, resulting in increased reliability and validity. TA-studies are such a methodology.

The following discussion will partly be organised around the parameters space (i.e. geographical area of the ecosystemic research), time (i.e. the time span of the ecosystemic research, together with whether it takes place before, during and/or after the intervention), and scale (i.e. the system level of the ecosystemic research).

5.2 Modes of ecosystemic research

This paragraph relies heavily on Gross (1984b) in its outline of three methodological modes used in ecosystemic research by ecological anthropologists. They confront some basic methodological issues concerned with generalising from micro-level investigations to macro-level social and ecological processes. The methodological forms presented are all aimed at understanding basic processes of stability and change in society:

1. *Comparative analysis*. This mode "... involves selection of homologous social units widely separated in space which are believed to be similar in certain aspects of structure and function" (Gross 1984b: 256). Although not exclusively so, this form is best suited for comparing systems which differ in some respect,
2. *Cross-sectional analysis*. This synchronous form of analysis is usually conducted within a single relatively uniform area. According to Gross, "The purpose of cross-sectional analysis is to detect differences in otherwise similar segments of cultural or social units that have been exposed to known influences which may have produced changes" (1984b: 257). Cross-sectional analysis is particularly useful in applied studies where recommendations must be forthcoming very fast, and
3. *Longitudinal analysis*. This diachronic mode of analysis is more time consuming, and can be used when there is sufficient time to observe directly the changes taking place at different points in time. Longitudinal analysis may demand considerable time periods to see change unfolding. However, "... there is no more reliable means for understanding change over time in human populations. In longitudinal analysis, processes unfolding in time may be directly observed together with the factors thought to be responsible for them" (Gross 1984b: 258-59).

5.3 Ecosystemic research and TA-studies

A simple model for the use of TA-methodologies in ecosystemic research can look like this:

1. *Comparative analysis*. Restricted applied applicability,
2. *Cross-sectional analysis*. This situation is generally characterised by high values on scale and space, and low values on time. A combination of recall-methods and random visit-methods to get processual perspectives is recommended, and
3. *Longitudinal analysis*. This situation is generally characterised by low values on scale and space, and high values on time. Random visit-methods are recommended with fixed interval-methods added if circumstances permit. In reality, one will often find that the two last modes of analysis are mixed. The final choice of TA-methodology depends on a

number of factors, among them available time, resources, observer-respondent relations, research orientations, etc.

5.4 Interventions in surface water systems and TA-studies: An example

Possibly the largest planned intervention in surface water systems of Bangladesh is the Sandwip Crossdam Development Scheme (Govt. of Bangladesh 1986b). By way of exemplifying the above model, it is tempting to end by sketching briefly how TA-studies could be integrated in a concerted ecosystemic study initiated before this planned project starts up:

1. *Phase I.* This first phase mainly consists of a comparative analysis. To increase predictability, comparison should be made with other coastal areas in Bangladesh where similar interventions have been made,
2. *Phase II.* This phase involves a cross-sectional analysis of the future project area. TA-methodologies, i.e. the recall-variant, enter here. The aim is to establish the situation prior to intervention, and
3. *Phase III.* This phase starts up before the project is initiated, and involves a longitudinal study of how the building of the dam affects the ecosystem and especially the local populations. The random visit-method is utilised here. Depending on constraints of time and other resources, the schedule can be made accordingly. A minimum would probably be a one-month survey in the busy season and another one-month survey in the slack season. In case of this project, changes will come very soon, and this phase will therefore function as a unique monitoring instrument of the situation in the project area as it develops during construction of the Crossdam.

Annex 1: Maps

Map 1: *Dekhar Haor and Moha Singh River*

Map 2: Villages around *Dekhar Haor* and along *Moha Singh River*

(see page 11)

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