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RESEARCH ARTICLE

AGRICULTURAL INFRASTRUCTURE AND LEVEL OF MODERNIZATION AMONG THE RURAL FARMERS DURING THE 80'S IN THIRUPPARANKUNDDRAM PANCHAYAT UNION OF MADURAI DISTRICT

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ABSTRACT

The present study analyzed the agricultural infrastructure and level of modernization among the rural farmers during the 80's. The Main Sources of data were based on primary and secondary data. Primary data was collected from 100 respondents during the authors' M.Phil research period (1990-91). The geographical data was collected from the statistical office at Madurai. The questionnaire information was suitably converted into tables. Simple statistical techniques were extremely employed to analyze the data and determination of the findings. Standard coefficient technique is used to measure the level of modernization. The agricultural infrastructure such as land holding, irrigation and source of irrigation were taken for the analysis. The modernization of agriculture among the rural farmers is analyzed based on the primary data collected using pre-tested and pre-coded questionnaire. Four villages selected to represent various socio-economic characteristics. The villages selected were Virahanur, Paniyur, Sholamalai and Valayangulam. In each villages of 25 farmers and the total of 100 respondents were taken. Finally attempted to summarize the facts and findings of the study and present in a framework towards strengthening the agricultural activity.

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INTRODUCTION

Agriculture is one of the oldest and most important occupations of man. Land is the most significant among the natural resources of any region. Agriculture is the chief occupation of mankind. Even now more than 50 percent of the world population depends upon agriculture though this percentage varies greatly from country to country. Although agriculture has been developed to significant scale in India. Recently its effects are often multi field owing to the expansion of population. Hence the study on agriculture has become significant. Many research works have already been conducted on various aspects of agriculture in various regions. In the present study an attempt is made to study the agricultural infrastructure and level of modernization among the rural farmers during the 80's in the Thirupparankundram Panchayat Union of Madurai District of Tamil Nadu State.

Agricultural Geography

The branch of geography that analyses the various aspects of agricultural activities has come to be known as agricultural geography. It had its origin in the late twenties when agricultural regionalization and regional description were its common themes. Laut (1970) defines agricultural geography as study of the description of the spatial distribution of agricultural activities and the factor which creates peculiar

forms of agriculture in particular places. The history of mankind is closely related to the history of agriculture. So, the agricultural geography has long been a key component of human geography (Michael, 1986).

Importance of the present study

The economy of this region is depending on both agriculture and non agricultural activities. Further this panchayat is located nearer to the Madurai agglomeration. To analysis of this study will help in comparison of growth to till date and future prediction will highly helpful for the planners and policy makers in the field of agriculture in order to gain more benefit for long term.

Aims and objectives

The main aim of the present study is to analyze the availability of agricultural infrastructure and to identify the level of modernization among the rural farmers of Thirupparankundram panchayat union for the comparative study to present and for the prediction to future plan.

REVIEW OF LITERATURE

A number of empirical studies (Hazell and Röell 1983; Haggblade Delgado and others 1998; and Fan, Zhang and Zhang 2002) conclude that the multiplier effects of

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agricultural growth are usually greater than two. The size of the multiplier effects varies spatially and over time, reflecting differences in consumption, investment, and saving patterns. In general, "the multiplier effects tend to be high when agricultural growth is driven by broad-based productivity increases in a rural economy dominated by small farms, as in much of Asia (Mellor 1976). Small- to medium-sized farm households typically have more favorable expenditure patterns for promoting growth of the local nonfarm economy, including rural towns, since they spend higher shares of income on rural nontraded goods and services, which are also generally more labor intensive" (Hazell and Röell 1983).

In a study of four African countries, Delgado and others (1998) estimated the income multipliers to be around 2.5, meaning that each additional dollar of income from agriculture generates about \$2.50 of economic growth in the economy as a whole. In the more open economies of Asia, where rice was more tradable than most African staple foods and local prices more easily reflected border prices, the multiplier effects were close to 2 in the early stages of agricultural modernization when productivity gains were the fastest. In addition, Gollin, Parente, and Rogerson (2002), using data for 62 developing countries during 1960-1990, find that agricultural growth, nonagricultural growth, and sectoral labor shifts explain 54 %, 17 %, and 29 % of the growth of GDP per worker, respectively. Weber (1958) the importance of psychological factors in economic development has become more and more widely recognized. Among the more notable researchers is David C. McClelland. He summarizes an interlocking series of empirical studies suggesting that a particular human motive the need for achievement -- promotes entrepreneurship, which in turn is a key to economic growth. Achievement motivation (n-Ach) is an inner concern with achievement, a disposition to engage in activities in which doing well or competing with some standard of excellence is important.

More recently McClelland(1961) has emphasized the point that n-Ach is a desire for excellence not so much for the sake of social recognition as to attain an inner feeling of personal accomplishment. Together with Atkinson, Clark, and Lowell, McClelland has also developed a projective technique, based on Murray's Thematic Apperception Test (TAT), to measure n-Ach. A careful study reported by Levine (1966) illustrates, in still another context, the importance of motivational differences. He observed that the Ibo in eastern Nigeria are much more upwardly mobile and economically successful than the Hausa of northern Nigeria. He attributes the difference in n-Ach level in the two subcultures to differences in their traditional status mobility system rather than in their child-rearing practices or religious ideologies. Wharton (1966) reported that subsistence farmers also respond as quickly to economic stimuli "as the most commercialized farmers in the modern world. It has been reported by McClelland and Winter (1969) that among the subsistence farmers, those who are high on achievement motivation are responsive to economic stimuli and vice versa. Agricultural development has a significant potential to contribute to nation-wide poverty reduction through direct effects on farm incomes and employment and indirect effects on overall economic growth, as well as its impact on food prices. A number of studies have found a positive correlation between agricultural growth and poverty

alleviation (see Byerlee, Diao, and Jackson, 2005 for a more detailed review). It is empirically shown that poor people tend to benefit more from economic growth originating in agricultural sectors than from that originating in industrial or service sectors (Ravallion and Datt 1996; Ravallion and Chen, 2004; and Timmer, 2002, 2005). In addition, Ravallion and Datt (1996), using data for India over 1951-1990, show that rural growth through agricultural development reduces poverty not only in rural areas but also in urban areas and hence has a significant and positive effect on national poverty reduction.

Minten and Bart (1999) attempted to understand the level of influence of infrastructure on the prices of agricultural produces in Madagascar. Since changes in the prices of food grains do impact on the welfare of the individuals through alteration in consumption, the study investigated whether presence of infrastructure (especially the transportation) often determines the price level after market liberalization as transport costs, that is different due to distance and the quality of infrastructure, influence how the benefits (costs) from a liberalized environment are shared between producers and other economic agents, i.e. transporters, middlemen, and consumers. The study found that hard infrastructure is an important determinant of producer price levels. Price levels decrease significantly as the distance to main roads increases and the quality of infrastructure decreases, and they decrease relatively faster over shorter distances than over longer distances. It is shown that distance matters more than road quality as there is no strong relationship between road quality and the decline of producer prices per unit of time, and as increased quality decreases time traveled only marginally. Moreover, this study found that road infrastructure does not automatically lead to more competition among traders as hard infrastructure by itself does not seem to increase the possibility of choice between traders. In a study by Deno and Eberts (1989), it was found that a significant increase in personal income was appropriated when infrastructure (of all types) was created in rural areas. However, the authors concluded that most of the effect lasted only for a short span of time -- usually less than one year. The installation of physical infrastructure has the potential to generate employment as workers are used in the construction process.

Jacoby and Jake (1994) observes that construction jobs are created rather rapidly following the brief contracting period that is necessary after a decision is made to invest in a project. The specific number of workers needed in the construction process varies considerably based on the size and type of project and the labor intensity of the facility being built. He also reviews some U.S. research on job creation in transportation construction. He finds an average of 10.4 jobs is created in rural areas for each \$1.0 million (1984 dollars) spent. Only 9.6 jobs are generated for each \$1.0 million in urban areas. He notes that job creation ranges from 7.4 jobs for every \$1.0 million spent for resurfacing to 11.5 jobs per \$1.0 million spent for major road widening. Two different criticisms against this finding come from other empirical studies, which is discussed in the next section. Aschauer's (1989) first study, using aggregate macroeconomic data, motivated the recent spate of research with his finding that infrastructure is extremely productive. Some of his research indicated that infrastructure is so productive that it can pay for

itself in a single year, a seemingly unlikely result. His research also suggests that returns to transportation were much greater in the period up to the early 1970s than in subsequent years. These results can lead to the conclusion, for example, that investments in building the initial highway network were very large, but the returns to building another network (or significant expansions in the existing network) would be very small (Fernald and John, 1999).

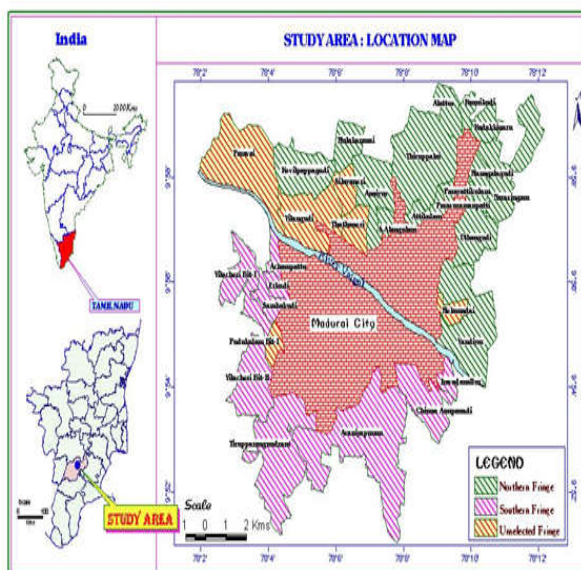
Fox and Murray (1990) examine the start-up rate for businesses in county areas of Tennessee. They consider the effects on business start-ups of a number of public policy factors such as taxes, government spending, infrastructure, and education. They find limited evidence that infrastructure is a determinant of where start-ups occur. The presence of interstate highways is consistently related to the start rates of firms of essentially every size. Local rail service also affects the start-up of certain sized firms. Access to airports, broader measures of highway availability, and infrastructure prices did not have a consistent effect on start-up rates. Fox, Herzog, and Schlottmann (1989) do not directly investigate the effects of infrastructure but do determine that the public sector characteristics of an area, such as local public services and taxes, are important determinants of migration decisions. They separate migration decisions into the decision to move, the decision to move within the general area where one already lives, and the decision to enter a new area. They find that public variables are generally more important in pushing people from the area where they live than in attracting them to a new area. The greater information that people have about where they live versus where they might go is hypothesized as the reason. Thus, the lack of quality infrastructure in many rural areas will have its greatest effect through pushing existing residents out, to the extent these same effects hold for infrastructure.

Study area

The following summary is presented based on the present analysis. The Thirupparankundram Panchayat Union selected for analysis is located in the Madurai South taluk of Madurai District in the Southern part of the Tamil Nadu State.

It is located between 9°45' and 9°59' North latitude and 77°58' and 78°11' East longitudes, covering an area of 293.77 sq.km and supports a population of 1,48,648 persons (1981 census). It is classified into seven firkas consisting of 43 village panchayats 3 town panchayats and 1 township. The study area consists of plain section with a few rock outcrops. The geology of the study area comprises the archaen rocks with quartzites, complex gneiss and charnokites. A small section of the Vaigai river flows in the northern part of this panchayat union. The study area has only one canal namely Nilaiyur Channel a branch Canal of the Periyar canal which takes off from river Vaigai. The study area experiences semi arid tropical monsoon type of climate with an average temperature of 28.1 °C. Analyzing the season wise distribution pattern of rainfall a significant amount of rainfall was received during the North East monsoon accounting for about 44.2 percent of the total rainfall. This is followed by the Southwest monsoon (38.10 %) and summer (15.7%). Winter months have received a low amount rainfall. Thus the monsoon seasons have received about 82.3 percent of the total rainfall. The annual rainfall amount fluctuates from year to year. The rainfall variability is about 25 percent and as such rainfall is less reliable. Hence the need arises to substantiate the water requirements for crops through irrigation. Well and tank irrigation plays a significant role in the agriculture of the study area.

The study area has a total population of 1, 48,648 persons (1981 census) with a density of about 506 persons per sq.km, which is higher when compared to the population density of Madurai District (359 persons per.km²). the concentration of population is more near the Madurai Urban Agglomeration. Of the total population about 59.6 percent lives in rural settlements and 40.4 percent, in urban settlements. The literacy level (51%) recorded in Thirupparankundram Panchayat Union for the 1981 census is higher than that of Madurai district (46.6%) and Tamil Nadu State (45.8%). Regarding occupational structure about 38.3 percent are classed as workers. About 46.6 percent of the workers are engaged in agricultural activities. About 22 percent of the workers are classed as cultivators and about 24.6 percent of workers are classed as agricultural laborers.



About 45.6 percent of the workers are engaged in other than agricultural activities. The study area is located nearer to Madurai Urban agglomeration and facilitated with good transportation facilities. National highways, Major District roads and meter gauge railway lines pass through this Panchayat Union.

MATERIALS AND METHODS

The data collection is carefully planned both at primary and secondary levels.

Primary data collection

The present investigation primary data is used to identify the level of agricultural modernization among rural farmers. For this purpose a pre-coded and pre-tested schedule was used to interview the farmers. This schedule was intended to collect data regarding the socio-economic characteristics and usage of modern inputs in agriculture by farmers.

Secondary data collection

The present study is mainly based on secondary data. Data on temperature, rainfall, land holding, demography etc are collected from the statistical office at Madurai.

Data analysis and techniques used

The data were suitably converted into tables drawn from both Primary and secondary data. The data were suitably converted into measurable simple statistical tables and also attempt to explain. Simple descriptive statistical techniques were extensively employed to analyze the magnitude of the infrastructure and modernization of agriculture.

RESULTS AND DISCUSSION

(i) Infrastructure

In the present study the size of land of land holdings considered under five classes namely less than 1 hectare, 1-2 hectare, 2-5 hectare, 5-10 hectare and more than 10 hectare which in turn represent marginal, small, medium, big and large size holdings respectively. The following Table 1 shows the pattern of land holding in the study area for the year 1988-89. The analysis of the pattern of land holding reveals that the study area consists of 21330 holdings covering an area of 13053.17 hectares.

Table1. Thirupparankundram Panchayat Union-Pattern of land holdings. (1988-89)

Size class of land (In hectares)	No. of holdings	% to total No. of holdings	Area in hectares	% to total area
Less than 1	20205	94.7	8855.30	67.8
1-2	634	2.9	1479.89	11.4
2-5	446	2.1	1897.98	14.5
5-10	39	0.2	405.14	3.1
More than 10	6	0.1	414.86	3.2
Total	21330	100	13053.17	100

Source: Statistical office, Madurai

Out of this about 94.7 percent of the holding fall under less than 1 hectare size occupying about 67.8 percent of the total cultivable area. This is followed by land holdings of 1-2 hectares (2.9%) occupying about 11.4 percent of the total

cultivable area. Thus it is obvious that the proportion of marginal and small size holdings account for a significant proportion of about 97.6 percent of the total cultivable area in the study area. In the study area wells, tanks and canal form the major source of irrigation (Table 2). The proportion of area irrigated to the gross sown area shows an increasing trend from 54.7 percent (1980-81) to 73.7 percent (1988-89). Well and tank irrigation are significant on the study area. Area irrigated by wells has increased from 29 percent (1980-81) to 45.6 percent (1988-89). Area under tank irrigation has shown a decrease from 44.8 percent (1980-81) to 35.3 percent (1988-89). Canal irrigation accounted for about 26.2 percent in the year 1980-81 and decreased in the year 1988-89 to about 19.1 percent of the total area under irrigation. It is found that the study area has experienced a significant increase in area under well irrigation in the study area (Table 3).

(ii) Modernization

The level of modernization is identified for the Thirupparankunram panchayat union on the basis of selected sample villages. The present study 8 variables is selected to indicate modernization. They are

- Number of persons using tractors.
- Number of persons having energized irrigation wells.
- Number of persons using recommended doses of chemical fertilizers.
- Number of persons using plant protection measures.
- Number of persons using power sprayer.
- Number of persons using hand sprayer.
- Number of persons adopting new methods after listening to radio programmes.
- Number of persons using organic manures.

In each these 8 variables the maximum value is given a weightage of 100. The other values are converted proportionally for all variables to arrive at standard coefficient are summed up. The maximum value is given 100 and the other values converted into proportionally. The analysis of modernization of agriculture in the Thirupparankundram Panchayat Union shows that out of the 100 respondents 85 percent cultivate their own lands while 11 percent are tenant cultivators. Most of the respondents live in their own houses with minimum facilities. About 4 percent are owner cum tenant cultivators. Most of the respondents live in their own houses with minimum facilities. About 79 percent of the houses have used cement as the material for constructing the walls. About 82 percent of the respondents

live in spacious houses with more than 2 rooms. About 40 persons own Television, 4 have VCR and 3 have Refrigerators. About 21 respondents possess gas stove and 20 respondents use pressure cooker for cooking. Thus the

Table 2. Thirupparankundram Panchayat Union-intensity of irrigation (1980-81 and 1988-89)

Year	Area under irrigation in % to GSA	Area under Tank irrigation in % to total irrigated area	Area under Well irrigation in % to total irrigated area	Area under Canal irrigation in % to total irrigated area
1980-81	54.7	44.8	29.0	26.2
1988-89	73.7	35.3	45.6	19.1
Index No*	135	79	157	73

(Index No= Area in the current year/Area in the base year * 100)

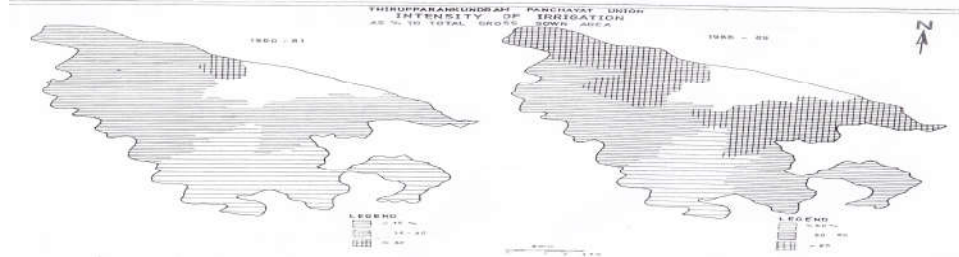
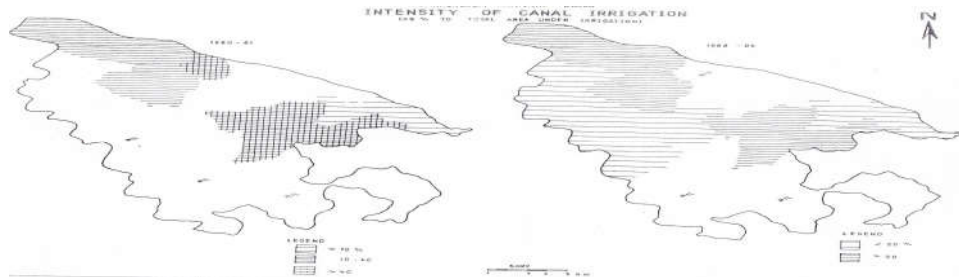
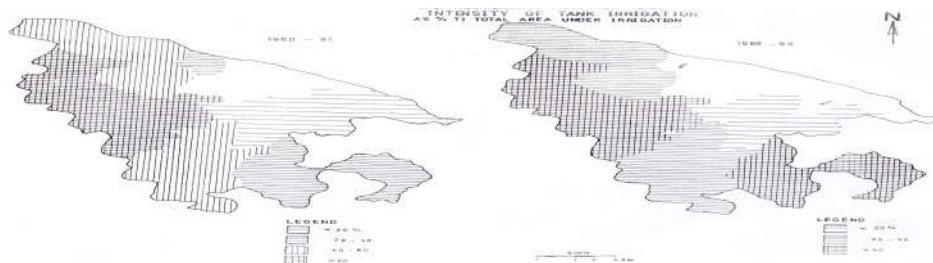
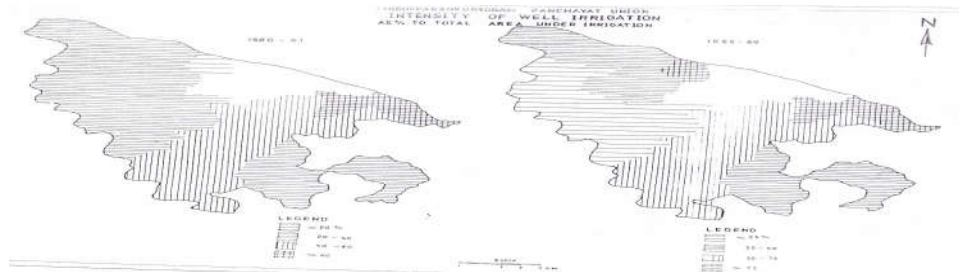


Table 3. Thirupparankundram Panchayat Union- source wise intensity of irrigation (1980-81 and 1988-89)

Name of the firkas	Intensity of irrigation% to GSA	1980-81			Intensity of irrigation% to GSA	1988-89		
		Tank	Well	Canal		Tank	Well	Canal
Thirupparankundram	69.2	77.4	22.6	-	73.3	75.1	24.0	0.9
Avanipuram	79.5	4.2	43.1	52.7	84.3	3.6	55.9	40.5
Kelamadurai	73.6	10.8	84.1	5.1	84.8	-	87.3	12.7
Melamadurai	84.0	36.2	7.7	56.1	97.1	-	100.0	-
Nagamalai	71.1	41.3	20.2	38.5	83.0	25.8	25.5	48.7
Valayangulam	15.3	54.1	45.9	-	53.0	29.1	70.0	-
Virahanur	28.4	75.8	24.2	-	68.0	70.0	30.0	-



The intensity of canal irrigation is significant in Avaniyapuram and Nagamali Pudukottai firkas



The intensity of well irrigation is significant in Kelamadurai, Melamadurai and Valayangulam firkas. Thus almost all the firkas are irrigated through some source or other

standard of living of the respondents is not too low as they live in their own houses and possess a number of modern household appliances and means of entertainment. The analysis of modernization of agriculture in the Thirupparan kundram Panchayat Union shows that out of the 100 respondents 85 percent cultivate their own lands while 11 percent are tenent cultivators. Most of the respondents live in their own houses with minimum facilities. About 79 percent of the houses have used cement as the material for constructing the walls. About 82 percent of the respondents live in spacious houses with more than 2 rooms. About 40 persons own Television, 4 have VCR and 3 have Refrigerators. About 21 respondents possess gas stove and 20 respondents use pressure cooker for cooking. Thus the standard of living of the respondents is not too low as they live in their own houses and possess a number of modern household appliances and means of entertainment. Modernization is influenced more by personal contacts and off farm income. When the level of modernization in agriculture increases simultaneously the basic facilities in the houses. Household appliances increase indicating the improvement in the living standard of the farmers. From the study on modernization the following findings are reported:

- 1) In the entire Panchayat Union fairly high level of modernization in agriculture is found in the firkas located near the Madurai Urban agglomeration.
- 2) Assured supply of water through energized wells and accessibility to Madurai city have resulted in a high level of modernization in the study area.
- 3) The tank and well irrigated region in the southern part of the study area has attained moderate level of modernization. Even though this is a dry region the increase in private energized source of irrigation in the form of wells especially in the firkas located along the state highways has helped this region to reach a moderate level of modernization.
- 4) In the dry region of the south, the level of modernization is low due to dry conditions, lack of assured irrigation, less accessibility and low income of the farmers.

Conclusion

The intensity of canal irrigation is significant in Avaniyapuram and Nagamali Pudukottai firkas. The intensity of well irrigation is significant in Kelamadurai, Melamadurai and Valayangulam firkas. Thus almost all the firkas are irrigated through some source or other. From the spatial pattern of modernization it is found that the maximum level of modernization (100%) is seen in Virahanur village followed by Panaiyur (74%) both the villages located in Kelamadurai firka near Madurai Urban Agglomeration. The level of modernization is significant in those places with higher off farm income and easy accessibility. Valayangulam has a moderate level of modernization (31%) due to lack of irrigation, low soil fertility low off farm income, low accessibility etc. In the conclusion it may be stated that about 75 per cent of the study area has reached a high to moderate level of modernization.

Recommendations

Governments must allocate adequate resources in their annual budgets and implementing agencies including banks must have concern, commitment and accountability to put in place

infrastructure in each village in a time bound program. Performance of each and every program/scheme should necessarily be available to the public every month through local print and electronic media, as a part of right to information

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