Income Change Perception: The Study on Social Ecology of Tea Garden

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ABSTRACT

The social ecology of tea gardens in North-Eastern part of India has been characterized with the polymorphic interactions amongst and between three sets of sub- ecological cybernetics viz. physical, biological and social ecology. The present study has highlighted these polymorphic interactions of income of both temporary and permanent laborers working in the tea gardens of Upper Assam with components of sub-ecologies of social, physical, biological ecology. The respondents have been 82 by count and selected through both purposive and random sampling approaches. The results show that conspicuous impact was seen in change in income of both temporary and permanent tea garden laborers in the past three decades that had treacherous effect on their living. The regression analysis has been conducted to see the causal proficiency of set of variables from the left side from X_1 to X_{17} on the consequential character that is Income of both temporary and permanent laborers. All these .have been done to establish and estimate the pattern, direction and intensity of interaction of change in income of temporary and permanent laborers to ultimately estimate the ecological behavior of that tea garden setup to eventually derive and elicit their behavioral traits in the changing climatic, biological and physical setup in tea garden ecosystem.

Keywords: *Sub-ecological cybernetics; Social ecology; Polyhedral interaction; Tea garden ecosystem;*

The tea garden community in North-East India is the most vulnerable to poverty, limited choice of employment opportunities and have become direct and indirect subjects of discrimination in the superior part of the society *Bharali (2007).* Inspire of countless reform promises for these affected faction of people by the government for conferring them their basic rights, they remain one of the worlds' poorest and least developed part of population. India, has, however, experienced a greater progress in reducing human poverty, which includes education, health and other sources of human capital particularly in North-eastern states than in reducing income poverty alone ASRLMS-Annual Action Plan, (2012-13). The level of income is closely linked to level of deprivation (socio-economic, political and psychological) and to nature of inequality prevailing in the country *Whelan et al.(2000).* The effects of income change are quite visible in terms of their standard of living. The change in income of a tea garden laborer affects not only the household as a whole but also generates greater burden in managing household production and consumption under conditions of severe scarcity. The laborers in the tea garden are on daily wages that do not provide any possibility of savings and mobility that resulted in total dependence on the plantations with no alternatives *Bharali (2007).* The welfare schemes for the laborers in the tea gardens are in very pathetic conditions. Majority of the tea gardens don't have proper health facility, drinking water, sanitation, and electricity connection etc. *Saikia (2009).*

In context of depravity amongst the tea garden community in North- East India, a number of measures to improve the income status were employed such as the creation of quotas to ensure their participation in the government jobs, in public service and local government and of special measures to increase girls' enrollment in schools *Sarma (2013)* Apart from government initiatives, a large number of NGOs are operating for the development of tea garden workers. Radical changes in incomes have discernible impact on annual household income, food availability, housing condition, water source (availability of drinking water,

quality of drinking water), health status (ability to get health treatment), education, sanitation and hygiene (possession of a toilet, toilet condition), Participation in social activities adds to family misery. Therefore, change in income as perceived by the Tea Garden workers in Moijonga tea garden has affected the community adversely. Tea gardens have a unique ecological behavior and generates plethora of ecological disposition which are socially, economically and, of course, ecologically important. The expansion of tea gardens in small and private holdings have added entry of new livelihoods and exit of traditional livelihoods contributing together to constitute a new area of social ecology. The objectives of the study are as follows:

i. To explore the relationships between change in Income of temporary and permanent tea garden laborers with the predictors.
ii. To analyze the impacts of change in Income of temporary and permanent laborers over decades as a whole.
iii. To formulate strategies to combat the existing condition of income and uplift socio-economic condition of the laborers.

METHODOLOGY

The present study was conducted in Matia block of Goalpara district (Assam). The district, block and village were selected purposively and the respondents were selected randomly. A pilot study was conducted in the selected villages before constructing the data collecting devices. In course of this survey informal discussion was carried out with some farmers, local leaders and extension agents of the localities. An outline of socio-economic background of the tea garden workers, community members, stakeholders, teachers, managers and supervisors of the concerned tea garden and its adjoining villages, their opinion towards changing tea garden ecosystem both in terms of biodiversity and social ecology.

The main statistical tools used were mean, standard deviation, coefficient of variation, weighted mean, factor analysis, multiple regression, and correlation coefficient. All these .have been done to establish and estimate the pattern, direction and intensity of interaction to ultimately estimate the ecological behavior of that tea garden setup to ultimately derive and elicit their behavioral traits in the changing climatological, biological and physical setup.

RESULTS AND DISCUSSION

Table 1. Decadal changes in income of temporary and permanent laborers

Change parameters	Decades	Extraction	% Variance
Change in income for temporary laborers (y_1)	1990-2000	0.986	56.184
Change in income for permanent laborers (y_2)	1970-1980	0.530	44.742

From the Table 1 above, it can be deciphered that there is a sizeable change in income of the laborers working in the tea garden of the study area. The change in income is comparatively more for the temporary laborers which are 56.184 per cent during the cohort 1990-2000. Whereas the change in income for the permanent laborers was seen highest during the cohort 1970-1980 that is 44.742 per cent, since then the income has not changed considerably which reduces their standard of living and can be considered as a reason of less development in the region as the region is dominated by tea garden laborers.

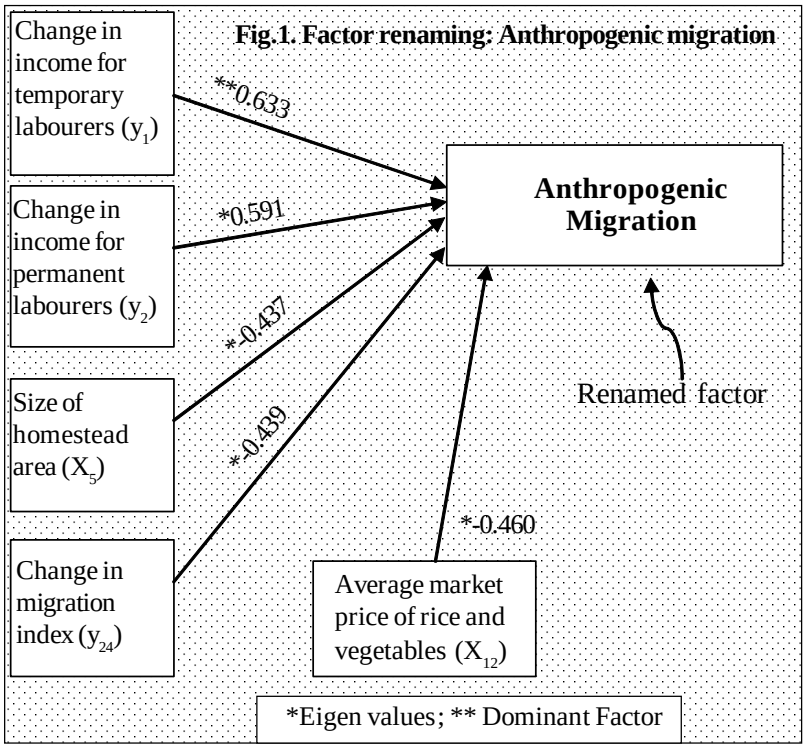

Fig.1. Factor renaming: Anthropogenic migration

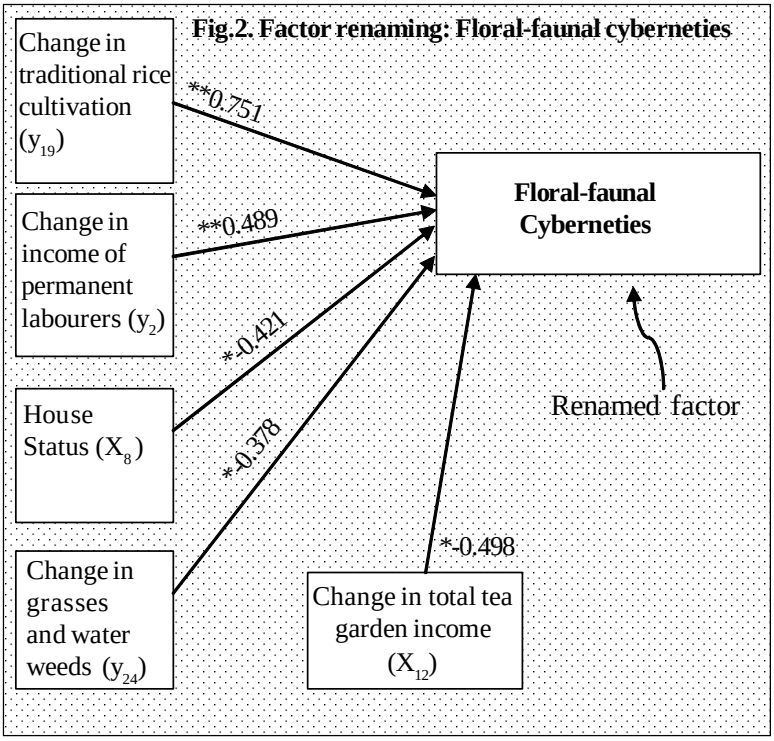

Fig.2. Factor renaming: Floral-faunal cyberneties

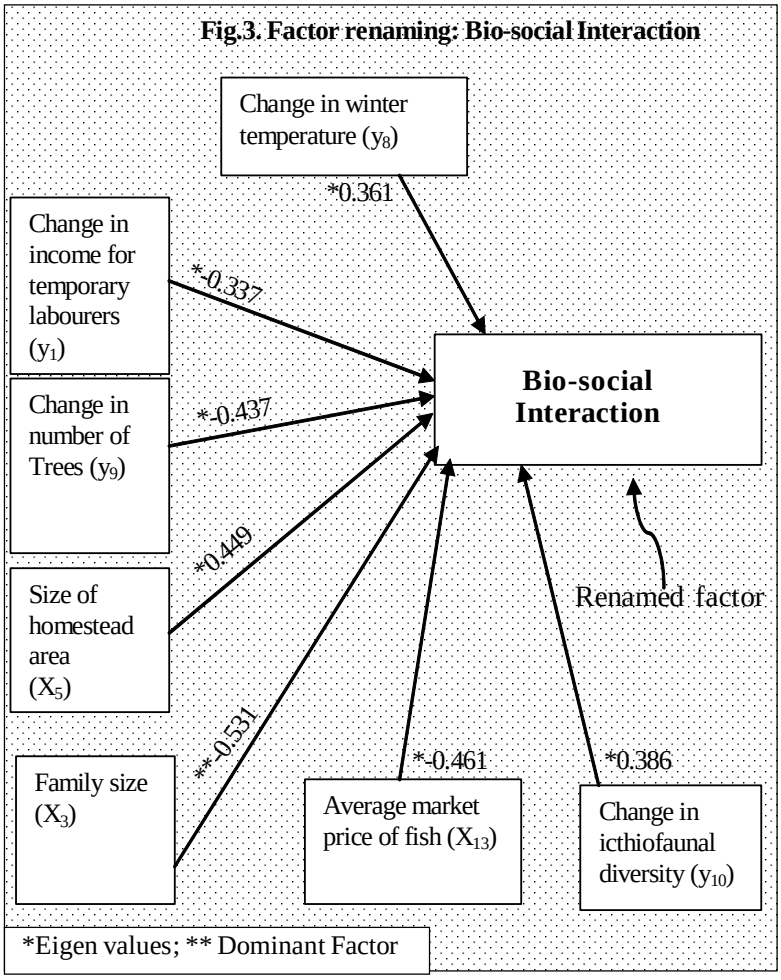

Fig.3. Factor renaming: Bio-social Interaction

A significant inclusion in this factor is change in income for temporary laborers (y_1) which is an important character in this Social Ecology. This is a unique conglomeration to be renamed as *Anthropogenic Migration.*

A significant inclusion in this factor is change in traditional rice (y_{19}) which is an important character in this social ecology, the new factor generates therewith can be renamed as *Floral-Faunal Cybernetics.*

A significant inclusion in this factor is family size (X_3) which is an important character in this Social ecology. The new factor emerges out of the conglomeration has been renamed as *Bio-Social Interaction.*

Table 2. Co-efficient of correlation: change in income of temporary laborers (y_1) vs (X_1-X_{17}) independent variables

Variables	'r'	SL*
Age (X_1)	0.098	0.383
Education (X_2)	0.048	0.669
Family size (X_3)	-0.025	0.821
Family education (X_4)	-0.136	0.222
Size of homstead area (X_5)	-0.064	0.569
House status (X_6)	0.169	0.129
Sanitation and hygiene (X_7)	0.119	0.289
Food intake value (X_8)	0.141	0.207
Watching T.V. (hrs/day *frequency) (X_9)	0.116	0.298
Listening radio (hrs/day*freq.) (X_{10})	-0.119	0.285
Interacting with cosmopolites (X_{11})	**-0.204**	0.066
Average market price of rice and vegetables (X_{12})	-0.180	0.105
Average market price of fish (X_{13})	0.155	0.165
Avg. distance to critical sites from respective residence (X_{14})	-0.126	0.259
Home innovation index (X_{15})	0.110	0.326
Cropping intensity (X_{16})	-0.010	0.928
Off – farm investment (X_{17})	0.111	0.321

*SL-*Significance level (2-tailed)*

Table 2 (Fig.4) reveals that change in income (y_1) of the temporary laborers, emanating from social ecology is well attuned with the variable that is interaction with

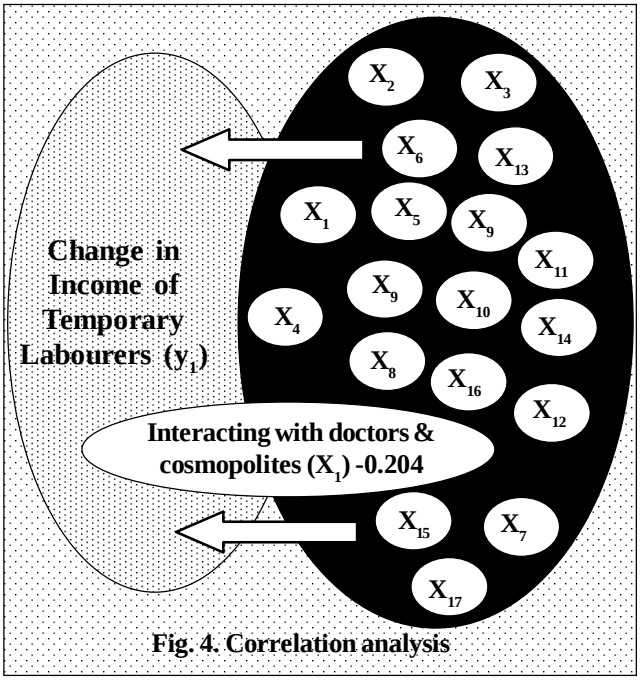

Fig. 4. Correlation analysis

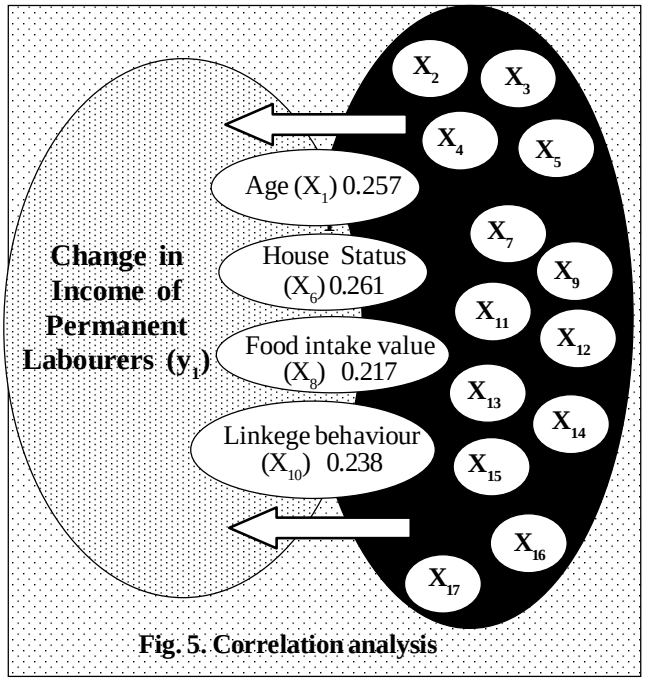

Fig. 5. Correlation analysis

cosmopolites(x_{11}). Income has become a driving component that can be attuned to the communication variable intrigued to social ecology.

Table 3. Co-efficient of correlation: change in income of permanent laborers (y_2) vs (X_1-X_{17}) independent variables

Variables	'R'	SL*
Age (X_1)	0.257'	0.020
Education (X_2)	0.062	0.583
Family size (X_3)	-0.192	0.085
Family education (X_4)	-0.024	0.828
Size of homstead area (X_5)	-0.075	0.501
House status (X_6)	0.261'	0.018
Sanitation and hygiene (X_7)	0.108	0.335
Food intake value (X_8)	0.217'	0.050
Watching T.V(hrs/day*freq.) (X_9)	-0.104	0.352
Listening radio (hrs/day*freq.) (X_{10})	-0.238'	0.031
Interacting with cosmopolites (X_{11})	-0.013	0.909
Av.market price of rice and veg. (X_{12})	0.007	0.949
Average market price of fish (X_{13})	-0.026	0.814
Avg. distance to critical sites from respective residence (X_{14})	-0.094	0.401
Home innovation index (X_{15})	0.037	0.738
Cropping intensity (X_{16})	0.053	0.635
Off – farm investment (X_{17})	-0.074	0.507

Table 3 shows change in income (y_1) of the permanent laborers, emanating from social ecology has shown significant positive correlation with Age (X_1), house status (X_6) , food intake value (X_8) and negative correlation with listening to radio(X_{10}).

Table 4. Regression analysis (backward): screening of variables having significant efficacy for characters change in income for temporary laborers (y_1)

Variables	'β'	SL*
Age (X_1)	0.054	0.450
Education (X_2)	0.092	0.668
Family size (X_3)	-0.063	-0.494
Family education(X_4)	-0.340	-2.242
Size of homstead area (X_5)	0.020	0.160
House Status (X_6)	0.086	0.459
Sanitation and hygiene (X_7)	0.151	1.037
Food intake value(X_8)	0.170	1.335
Watching T.V. (hrs/day*freq.) (X_9)	-0.004	-0.032
Listening radio (hrs/day*freq.) (X_{10})	-0.139	-1.117
Interacting with cosmopolites (X_{11})	-0.230	-1.864
Av.market price of rice and veg. (X_{12})	-0.135	-0.928
Avg. market price of fish. (X_{13})	0.152	1.144
Avg. distance to critical sites from respective residence (X_{14})	-0.146	-1.159
Home innovation index (X_{15})	0.188	1.227
Cropping intensity (X_{16})	-0.039	-0.324
Off – farm investment (X_{17})	0.160	1.326

Table 5. Model summary

Model	R	R^2	Adjusted R^2	SE*
1.	0.530	0.281	0.090	2.683

*Std. Error of the estimate

The predictors from social ecology vis. education, family education, sanitation and hygiene, food intake value, interaction with cosmopolites, listening to radio,

average market price of rice and vegetables, average market price of fish, average distances to critical sites, home innovation index and off- farm investment have been reflected in the perception changes in income for temporary laborers. So, these are the critical estimator of the ecological changes elicited through changes in temporary laborers.

Table 6. Regression analysis (step-down): screening of variables having significant efficacy for characters change in income for permanent laborers (y_2)

Variable	'ß'	't'	Significant
House status (X_6)	0.349	2.826	0.006
Age (X_1)	0.303	2.935	0.004
Food intake value (X_8)	0.264	2.498	0.015
Family education (X_4)	-0.290	-2.367	0.020
R^2	0.233		

Table 7. Model summary

Model	R	R^2	Adjusted R^2	SE*
4.	0.483	0.233	0.194	6.639

Table 6 and model 4 shows the impact of changes in income for permanent laborers on house status, age, food intake value and family education can be estimated to an extent of 23.3 per cent (R^2= 0.233).

CONCLUSION

The social ecology of a system studies the polymorphic interaction at various inter and intra levels. It is reflexive and normative, and indicates how humans ought to behave in relation to the environment, other species, and all extended ecological communities, so as to ensure their mutual co-existence.

In a tea garden system also such polymorphic and polyhedral interactions do take place at a larger scale. In fact, a tea garden ecosystem in North East India is a perfect example of a dynamic system which is linked with social, physical and biological sub- systems. On studying the inter relationships and associations at various sub-system level in a tea garden and its adjoining habitats, one can infer on its social, physical and biological ecology and determine the driving factors that render the ecosystem degrading. The linked up factors are also indicators of changes both at micro and macro levels and on carefully examining it, a comprehensive solution can be made. In developed nations, economics, social studies and environmental aspects, are integrated into the development processes to investigate a system minutely. But in India, particularly in Assam practically still there are big gap among them *Baruah (2011)*.

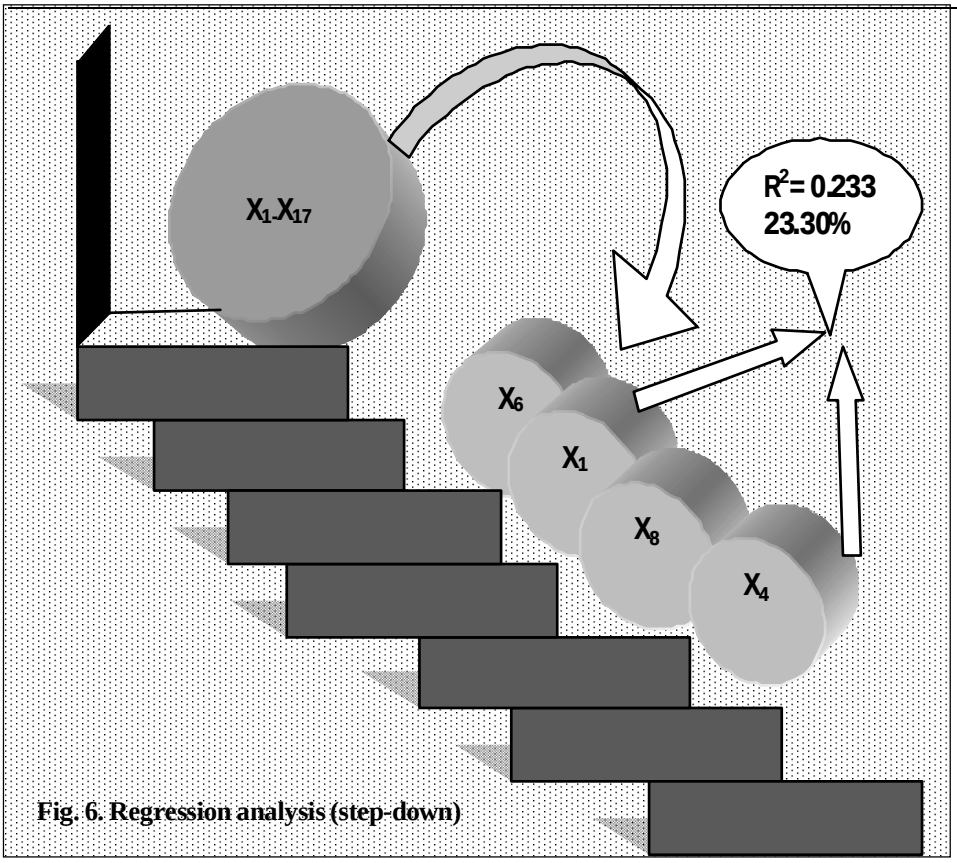

Fig. 6. Regression analysis (step-down)

1. Age (X_1)
2. Education(X_2)
3. Family size (X_3)
4. Family education (X_4)
5. Size of homstead Area (X_5)
6. House status(X_6)
7. Sanitation and hygiene (X_7)
8. Food intake value (X_8)
9. Watching T.V(X_9)
10. Listening radio (X_{10})
11. Interacting with cosmopolites (X_{11})
12. Av. market price of rice and vegetables (X_{12})
13. Av. market price of fish (X_{13})
14. Average distance to critical sites from respective residence (X_{14})
15. Home innovation index (X_{15})
16. Cropping intensity (X_{16})
17. Off-Farm investment (X_{17})

R^2=0.233

So, there is an urgent need to study the tea garden ecosystem with an integrated social-ecological approach for its development. The present study has considered the three sets of sui generis variables, be branded as social, biological and physical constellation of characters, depicts the following:

- Temporary and permanent laborers is a parameter of social ecosystem that is a seen to interact with components of physical and biological ecosystem.
- The change in income of temporary laborers in past three decades have shown a significant impact in the cohort 1990-2000 and variance in change in income was found to be 56.184 per cent whereas change in income of permanent Laborers were conspicuous in the year 1970-80 with percent variance of 44.742.
- Change in income of both temporary and permanent laborers and size of homestead area have formed a unique conglomeration called Anthropogenic Migration Index. Factor in which change in income of temporary laborers has a dominant role with highest impact in this conglomeration.
- Change in income for permanent laborers have formed a conglomeration with change in total garden income, constituent from change in grasses and water weeds and change in traditional rice and the factor is renamed as Floral-faunal Cybernetics.
- Change in winter temperature, one of the constituent from physical ecology has conglomerated with components from biological ecology like change in number of trees, change in icthiofaunal diversity and elements from social ecology like change in income of temporary laborers, family size, size of homestead area, average market price of fish and is renamed as Bio-social Interaction.
- Change in income of temporary laborers is significantly correlated with the variable interaction with cosmopolites (X_{11}). Since income is a driving component, income opportunities are affected by communication with resource persons. Thus, income can be well attuned to access communication variable. Whereas in case of change in income of permanent laborers age, house status, food intake value and listening to radio has been found to be significantly correlated.
- It has also been found that the variable having discernible causal effect on change in income for temporary laborers are education (X_2), family education (X_4), sanitation and hygiene (X_7), food intake value (X_8), listening to radio (X_{10}), interaction with cosmopolites (X_{11}), average market price of rice & veg. (X_{12}), average market price of fish (X_{13}), avg. distance to critical sites (X_{14}), home innovation index (X_{15}), off- farm investment (X_{17}) whereas variables house status (X_6), Age (X_1), food intake value (X_8) and family education (X_4) have a causal effect on change in income of permanent laborer.

So, the interdependent and mutually synchronized relationship amongst and between the physical, biological and social echelons have been the prime mover for ushering a social change vis. a vis. an ecological transformation as well. This kaleidoscopic vision of a system interaction and system performance can go a long way in putting up extension policy to a new plight.

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