



Economic analysis of small scale dairy buffalo enterprises in Bhola district of Bangladesh

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Abstract

The purpose of this study was to analyze the socio-economic structure of water buffalo farming at some selected coastal areas of Bhola district of Bangladesh. Data were collected from the 35 small and large farms by surveying during the period January to March, 2015. The study revealed that buffalo rearing was mostly practiced by middle (30-45yrs) and old (>45yrs) aged farmers than young farmers (<30yrs). Majority (45.71%) of the buffalo farmers were educated, have no organized housing facilities for sheltering and depend on locally available roughages and tree leaves to fed buffaloes. The average lactation length was found 228 days and milk yield was 2.1 litres/ buffalo/ days. The Gross Margin and Net farm profitability per dairy buffalo per lactation year over cash cost and non-cash cost were stood at Tk. 55866.65 & Tk. 51127.89 and Tk.44954.65 & Tk. 40435.39 for Herd size-1 and Herd size-2, respectively that indicates rearing of small- scale dairy buffaloes is highly profitable at coastal belt areas in Bhola District. The average Benefit Cost Ratio (BCR) was accounted for 1:7.51 and 1:3.11, respectively over cash and total cost basis considering both herds. Finding of this study indicates that buffalo rearing is highly profitable in the coastal areas of Bangladesh and a crucial pathway for poverty alleviation.

Key words: Benefit cost ratio, Bhola, buffalo, socio-economic status, management

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Introduction

Livestock is one of the most prospective sub-sectors of agriculture in Bangladesh which plays a fundamental role in promoting human health and national economy of the country. Buffaloes hold a crucial place in overall livestock economy of Bangladesh (Sarker *et al.*, 2013). They are called triplet animals as they serve three important purposes such as milk, meat and drought power supply (Ghaffar *et al.*, 1991). Buffaloes of Bangladesh may be classified into 3 categories: (i) Riverine types found in the sugarcane belt of the

country and mainly migrated from India, (ii) Swamp types found in the coastal areas and marshy land of the country and mainly indigenous in nature though a small number might have migrated from Burma, (iii) Crossbred type (swamp x river type) found in the coastal area of the country (Amano *et al.*, 1987). Buffalo farming has advantages related to the resistance of buffaloes to natural conditions and diseases, their ability to benefit from feed and to turn poor feed into meat and milk, and finally, their low

cost compared with cows (Canbolat, 2012). Indigenous buffalo cows produce two times more milk than cows with more milk fat and more tocopherol which is a natural antioxidant (Chantalakhana and Falvey, 1999). Buffalo is economically suited for the poor people. It requires less feed, care and attention than cattle. They are usual depend on tree leaves, shrubs and bushes in the rural condition. They graze on available land, marginal or uncultivated, and invariably walk long distances to achieve dry matter intake. The farmers raise buffaloes mostly in free grazing system but stall feeding is practically very rare in Bangladesh, although in adverse climatic conditions buffaloes are housed and provided stall feeding with tree leaves and natural grasses. They prefer to wallow in the rivers or canals as this is essential for their thermal regulation (Tulloch, 1974). There are several published reports regarding management system, reproductive and productive parameters of buffalo cows throughout the world (Hadi., 1965; El-Kirabi., 1995 and Suhail *et al.*, 2009) but there is very limited information of this issue in context of coastal areas of Bangladesh (Faruque *et al.*, 1990).

Bhola is the largest island as well as buffalo concentrated belt in Bangladesh. No study has been performed on the socio-economic status of the buffalo farmers and the management practices of buffaloes in Bhola district. The main purpose of this study was to determine the current conditions of buffalo management and production activity to contribute to future policies. The study was carried out to describe the social-economic characteristics of buffalo farmers; measure the profitability of rural buffalo farming practices in the study area; and determine the major problems buffalo farmers are facing.

Materials and Methods

Study area

Two villages namely Aslampur and Charmanika of Char Fasson upazila in Bhola district were selected to conduct the study. Char Fasson upazila covers

approximately 1106.31 km² in land areas of coastal regions of Bangladesh. This upazila is located at 75 km north of Bhola district between 22.1847°N and 90.7625°E containing 63,740 households. It is a land of rivers where plenty of pasture land is available and is very much suitable for buffalo rearing.

Data collection

A total of 35 respondents (18 from Aslampur and 17 from Charmanika) were randomly selected for data collection. All information was collected by personal interview from the individual farmer present in his or her own house/ bathan land of selected areas during the period January to March, 2015. The selected variables in this study were socio-economic profiles of buffalo owners, feeding, housing and management system, traits of productive and reproductive values of dairy buffaloes, costs, returns and profitability of dairy buffalo enterprises, benefit cost ratio, farmer's suggestions against crucial farming problems to increase buffalo production.

Data processing and analysis

After completion of field survey the entire interview schedules were set for its data tabulation after coding and reduction. All the individual variables of the interview schedules were transferred to master sheet to facilitate tabulation. Income from annual farming operations was obtained by summing up the returns/receipts from annual sale of animal products (milk sales), annual sale of live calf (animal sales) as by product.

The total annual cost of each farm operation was based on both annual variable costs and overhead costs (home supplied). The components used to calculate annual variable cost includes feed cost, cost of hired/contract/daily labour and imputed family labour, medicine, vaccination and therapeutic and preventive care cost, annual breeding cost etc. Annual overhead or fixed cost calculation comprised of opportunity cost of family supplied labour and permanent arm cowboy/employees, housing costs and miscellaneous

expenses (production losses due to animal sickness). Profitability of each farm was examined by adopting the following formulas: Net Profitability, $\pi = TR - TC$ Where, TR= Total milk produced per dairy buffalo per lactation multiplied by per liter buffalo milk price of the study area and TC equals to summing up all needed costs of inputs for buffalo rearing.

Results and Discussion

It is important to understand the socio-economic characteristics of buffalo farmers in the study area. This was done with the hope of identifying those characteristics that may impact and also help to explain the farming activities of the area. The characteristics considered were age, farmer's economic status, educational attainment, household size, land acquisition type, farming experience, agricultural land, and farm output sizes.

The highest number of farm owner's age between 30-45 years were 42.85% followed by 37.14% between 30-45 years and 20% age below 30 years (Table 1). Majority of buffalo farm owners reported to be comparatively literate primary to higher secondary was 11.42%, higher secondary was 42.85% and graduate and above was 45.71% (Table 1). Only 17.14% farm owners depend on buffalo as the main sources of income while the majority of owners had buffalo farming and cropping or fishing or small business (Table 1). The difference in educational status, main profession and purpose of farming of the owners was however not significant association with farm sizes. Almost 42.85% of the observed farm owner's yearly average income level was above Tk. 10 lakh, 37.14% was in between Tk. 5-10 lakh and 14.20% was below Tk. 5 lakh (Table 1). Among the farm owners, 40% farmers had experience between 10-15 years, 54.28% had own farms and 45.71% had farm business financed by bank (Table 1). Although farm owner with family members with casual labour reported to be involved in overall farm supervision in majority of farm (37.14%), but only 31.42 % of farm owner himself involved with regular farm supervision, while 31.42 % farmers were

involved with family head casual labours (Table 2). 48.57% farmers had no house for their buffaloes where as 31.42% farmers had traditional buffalo shed without fencing and 20% farmers had fencing housing system for buffaloes (Table 2). In case of 54.28% farm the buffaloes were depend on natural grazing. 37.14% buffaloes fed on open grazing with paddy straw and 8.57% buffaloes fed on dry roughage and green grass. Amin *et al.*, (2012) reported that buffaloes were mainly reared on extensive housing system with free grazing which was alike to the present study.

The average length of lactation in dairy was found higher between 220 to 260 days and was 78.73%. Average milk yield per day per buffalo of both herds was 2 to 4 liters and the average length of calving interval was found between 450 to 550 days where dry period of cows was found highest (73.01%) under 6 to 7 months (Table 3). According to Karim *et al.* (2013) the average lactation length of indigenous buffalo cows were 286.12 ± 11.27 , average of calving interval 547.92 ± 10 , average daily milk yield 3.33 ± 0.68 liters in Mathbaria upazila in pirojpur district, which was partially consistent with my present study where average lactation length was 228 days, average daily milk production 2.1 litre. The variation might be due to random sampling, variation in geo-climatic condition, feeding and nutritritional status, managemental status, of buffaloes of two regions. The study also showed that the price of buffalo milk was comparatively higher in indirect channel than the direct channel.

In the study areas, four major diseases of buffaloes were found namely hemorrhagic septicemia (HS), mastitis, Foot and Mouth Disease (FMD) and Black Quarter (BQ). Almost 16.50% buffalo farmers claimed about the occurrence of HS, 8.8% claimed about FMD, 9.84% claimed for mastitis and 2.53% claimed for BQ. Ali *et al.* (2012) also reported 16.25% HS cases in buffaloes. In the study areas, 74.28% farmers performed vaccination in their buffaloes, though 25.71% farmers did not perform any vaccination. Almost 77.14% farmers conscious about deworming

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Table 1. Socio-economic profiles of buffalo enterprise owners by categories of herd sizes

Types of Data	Number of owners with categories Buffalo enterprise by herd Sizes		
	Herd Size-1 (< 30 Buffalos) N=20	Herd Size-2 (> 30 Buffalos) N=15	*All (N=35)
Farm Owners age:			
• Below 30 Yrs	3 (15.00)	4 (26.67)	7 (20.00)
• 30- 45 Yrs	10(35.00)	5(40.00)	15(42.85)
• Above 45 Yrs.	7(50.00)	6(33.33)	13 (37.14)
Farm owners literacy level:			
• Primary to Secondary	2 (10.00)	2 (20.00)	4 (11.42)
• Higher Secondary	8(40.00)	7(46.67)	15 (42.85)
• Graduate and above	10(50.00)	6 (40.00)	16 (45.71)
Sources of Farm owners income:			
• Buffalo farming only	3 (15.00)	3 (20.00)	6 (17.14)
• Both buffalo farming & Cropping	5(25.00)	4(26.67)	9(25.71)
• Both buffalo farming & Fishing	10(50.00)	6(40.00)	16 (45.71)
• Both buffalo farming & Small business	2 (10.00)	2 (13.33)	4(11.42)
Farm Owners level of Income:			
• Below Tk. 500,000	3 (15.00)	4 (26.67)	7 (20.00)
• Tk. 500,001-Tk.10,00,000	7(35.00)	6(40.00)	13 (37.14)
• Above Tk.10,00,000	10(50.00)	5(33.33)	15 (42.85)
Occupation Status:			
• Buffalo faring only	3(15.00)	3 (20.00)	6 (17.14)
• Buffalo faring & Crop cultivation	10(50.00)	4(26.67)	14(40.00)
• Buffalo farming & Small Business	5(25.00)	6(40.00)	11 (31.42)
• Buffalo farming & Fishing	2(10.00)	2 (13.33)	4(11.42)
Farming Type:			
• Buffalo farming as a main business	4 (2.000)	3 (20.00)	7(20.00)
• Buffalo farming as subsidiary income	16 (80.00)	12 (80.00)	28 (80.00)
Duration of buffalo rearing life:			
• Below 10 Yrs	3(15.00)	2 (13.33)	5(14.28)
• 10 - 15 Yrs	8(40.00)	6 (40.00)	14(40.00)
• Above 15 Yrs	4(20.00)	2 (13.33)	6 (17.14)
Ownership Pattern of Buffalo Farms:			
• Owned	11(55.00)	8(53.33)	19(54.28)
• Rented in	3 (15.00)	4(26.67)	7(20.00)
• Shared in	6(30.00)	3(20.00)	9(25.71)
Financing for maintaining buffalo enterprises:			
• Fully Own Financed	3 (15.00)	3 (20.00)	6(17.14)
• Both own and Bank Financed	5(25.00)	4(26.67)	9(25.71)
• Fully Bank Financed	10(50.00)	6(40.00)	16 (45.71)
• Borrowed from Relatives etc.	2 (10.00)	2 (13.33)	4 (11.42)
Training status of the buffalo enterprises owners:			
• Experienced earned hierarchically	3 (20.00)	2 (20.00)	10 (20.00)
• Obtained govt. training from DLS	7(46.67)	5 (50.00)	22 (44.00)
• No training	7(46.67)	5 (50.00)	22 (44.00)
Distribution of Buffalo herds of 35 enterprises:			
• Number of Milking Buffalo	160	155	315
• Bullock	35	45	80
• Pregnant buffalo (1 st time)	49	32	81
• Calves	160	210	370
• Heifers	75	89	164

*Figures in the parentheses indicates percentage

Table 2. Supervision, feeding, housing and management system of Buffalo enterprises by herd sizes

Types of Data	Number of owners with categories Buffalo enterprise by herd Sizes		
	Herd Size-1 (< 30 Buffalos) N=20	Herd Size-2 (> 30 Buffalos) N=15	*All Farm (N=35)
A. Supervision and management of buffalo enterprises:			
Nature of supervising:			
• Farm owner himself	7(35.00)	4 (26.67)	11 (31.42)
• Farm family members with casual labours	7(35.00)	6(40.00)	13 (37.14)
• Family head with casual labours	6(30.00)	5(33.33)	11 (31.42)
Level of decision making on farming:			
• Mostly decided by owner himself	3 (15.00)	11 (73.33)	14(40.00)
• Partly being briefed with other family members and labour	7(35.00)	3(20.00)	10 (28.57)
• Not at all	10(50.00)	11(6.67)	11 (31.52)
B. Housing system of Buffalo enterprises:			
Type of Housing facilities:			
• Traditional Buffalo shed without fencing	3 (15.00)	8 (53.33)	11(31.42)
• Fencing housing system	5(25.00)	2(13.33)	7(20.00)
• No arrangement of housing	12(60.00)	5(33.33)	17(48.57)
B. Housing system of Buffalo enterprises:			
• Shawn's/ Leaf's made house	3 (15.00)	0 (00.00)	3(8.57)
• Tin's made house	17 (85.00)	11(73.33)	28(80.00)
C. Feeding practices of Buffalo enterprises:			
Nature of feeding practices:			
• Open grazing at open field	8(40.00)	11(73.33)	19(54.28)
• Open grazing with paddy straw feeding	10(50.00)	3(20.00)	13 (37.14)
• Dry roughages and green grasses	2(10.00)	1(6.67)	3(8.57)

*Figures in the parentheses indicates percentage

while 22.85% farmers were not interested to give any anthelmintics to their buffaloes. AI has not established in our country. Many farmers do not know about it. Only 25.71% farmers did AI for oestrous synchronization.

The total costs per buffalo cow per year were estimated at Tk.20345.35 and Tk.17003.70 for herd size 1 and 2, respectively. It was found that the cash expenses shared the major part of the total costs and accounted for Tk. 9433.35 and Tk.6311.20. The non-cash expenses per lactation year per dairy buffalo stood at Tk. 10910 and Tk. 10692.50 for herd size 1 and herd size 2, respectively. The item wise costs of rearing per dairy cows per year are presented in Table 4.

The returns from dairy buffalo consisted of selling of milk and selling calves. The average sale proceeds of

milk were calculated on the basis of the average lactation period (228 days), average quantity of milk produced per day per cow (2.1 litres) and the average price received by farm owners per litre of milk directly (Tk.100). It was assumed that the buffalo calves were sold out just after lactation period. The average value of calf was estimated on the basis of the farmer's expectation (Tk. 17000). The gross return per lactation year per dairy buffalo stood at Tk.65300 and Tk.57439.09 for herd size 1 and 2, respectively. The average returns from selling milk per lactation year were found Tk. 47800 and Tk. 42439, respectively. The average returns of produced calf were found Tk. 17000 for all categories of farms. The Gross margin per cow per lactation year over cash were estimated at Tk.55866.65 and 51127.89 and net return over total costs were also estimated in Tk.44954.65, Tk.,

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40435.39 respectively for small, medium and large farms. The Benefit Cost Ratio (BCR) was accounted for 1:7.51 and 1:3.11 respectively for both herds. The results regarding returns of small scale commercial dairy buffalo's enterprises were indicated that, the net profit per buffalo per lactation per year resulted higher

in case of herd size-1 than that Herd size-2 (Figure 1) in the study areas. The findings of this study indicate that buffalo farming is profitable which also supports the findings of Karim *et al.* (2012) and Sarker *et al.* (2013).

Table 3. Productive and reproductive parameter of buffalo's under milking by herd sizes

Types of Data	Number of Buffalo with categories of Enterprise by herd Sizes		
	Herd Size-1 (< 30 Buffalos) N=20 (160)	Herd Size-2 (> 30 Buffalos) N=15 (155)	*All Farm (N=315)
Ave. lactation length of per buffalo			
180-220 days	48(30.00)	19(12.25)	67 (30.79)
220-260 days	112(7.00)	136 (87.74)	248(78.73)
Ave. Milk yield per Buffalo per day			
1-2 liters	63(39.37)	17(10.62)	110(140)
2-4liters	97(60.62)	108(69.76)	205(79.33)
Ave. Length of calving interval			
350-450 days	50 (31.25)	72(46.45)	124(39.36)
450-550 days	110(68.75)	83(53.54)	193(59.38)
Ave. age of puberty			
3-4 yrs	60(37.50)	90(58.06)	150(96.77)
4-5 yrs	100(62.50)	65(41.93)	165(50.76)
Ave. dry period			
5-6month	30(18.75)	55(35.48)	85(26.98)
6-7 month	130(81.25)	100(64.51)	230(73.01)
Ave. Conception rate			
Single time	0(0.00)	0(0.00)	0(0.00)
2 to 3 times	30(80)	40(83.79)	70(21.53)
Above 3 times	130(20)	115(10.61)	245(75.38)

*Figures in the parentheses indicates percentage

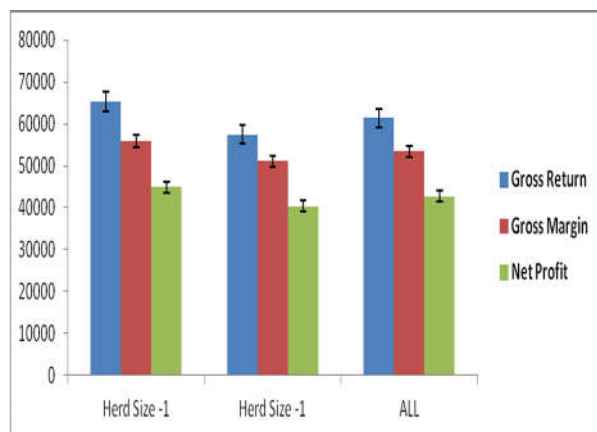


Figure 1. Profitability of farm

Floods cause an extensive loss to the economy of the buffalo farmers. As Bhola is a land of rivers. Every year floods loss a lot to the buffalo farmers. Almost 100% farmers are the victim of the natural calamities. About 94.28% farm owners reported insufficient veterinary care and service was one of the major problems. The grazing facilities or pasture land are very limited especially during cropping season, rainy season and dry period in coastal areas in Bangladesh. Almost 94.28% farmers faced the same problem at the study area. Animal health and production of milk depend on quality feeds, proper rationing and regular standard feeding practices timely. About 46% buffalo farmers claimed high

price of feed. About 77.14% farm owners had no knowledge about reproductive physiology of buffalo so they could not diagnose properly sign of heat. It was also a crucial problem. It was found that 68.57% animals were suffered with different types of endemic diseases (Table 5) due to insufficient veterinary

service. Inbreeding and Parasitic diseases are one of the major threats for buffalo health management system. Most of the buffaloes are infected with GI parasite in Bhola district (Biswaset al., 2013). Saadullah et al. (2009) also reported similar type of problems related buffalo farming.

Table 4. Yearly costs per dairy buffalo by categories of buffalo enterprises and herd sizes

Types of Data	Number of Buffalo with categories of Enterprise by herd Sizes									% in Total Cost
	Herd Size-1 (< 30 Buffalos) N=20 (150)			Herd Size-2 (> 30 Buffalos) N=15 (179)			ALL (N=35) (329)			
	Non-cash	Cash	Total	Non cash	Cash	Total	Non cash	Cash	Total	
Mixed bona paddy and green grass grazing	4275.00	2150.0	6425.00	5345.00	1050.0	6395.0	4810.00	1600.00	6410.00	34.88
Green Grass/Kalai grazing	2105.00	750.00	2855.00	1850.00	625.00	2475.0	1977.50	687.50	2665.00	14.50
Labour Cost	2150.00	3565.10	5715.10	1275.00	2125.00	3400.0	1712.5	2845.1	4557.55	24.80
Veterinary care with Deworming Medicine and treatment	-	1050.0	1050.00	-	875.00	875.0	-	962.50	962.50	5.24
Breeding Cost(A.I)	-	250.00	250.00	-	210.00	210.0	-	230.00	230.00	1.25
Production losses due to Disease Infection and sickness	-	657.50	657.50	-	750.00	750.0	-	407.75	407.75	2.22
Interest on operating cost (Accounted @12 rate of interest)	-	1010.8	1010.75	-	676.20	676.20	-	843.48	843.48	4.59
Sub-total (V.C)	8530.00	9433.35	17963.35	8470.00	6311.20	14781.20	8500.00	7576.28	16076.28	87.48
Cost of Housing	1355.00	-	1355.00	1177.00	-	1177.00	1266.00	-	1266.0	6.89
Land rent	1025.00	-	1025.00	1045.50	-	1045.50	1035.00	-	1035.0	5.63
Total Cost (T.C)	10910.00	9433.35	20345.35	10692.50	6311.20	17003.7	10801.0	7576.28	18377.28	100.00

In order to overcome the problems of small scale buffalo commercial dairying practices at coastal areas and making the such dairying practices more profitable, the dairy buffalo farm owners of the study area were asked to suggest how to overcome the identified problems. Following suggestions were put forward by the buffalo farm owners for overall development of small scale dairying practices as a sustainable level by the different sizes of dairy farm according to herd sizes. Natural available green grasses and fodder production may be decreased due to the fellow land came under cultivation and built in housing

infrastructures rapidly in Bangladesh. The cropping intensity of land also increased for meet up expanding demand of food stuffs of the people in our country. So for introducing sustainable and commercial dairy farming practices by livestock entrepreneurs HYV fodder production should be extended throughout the country by providing technological knowledge of the dairy buffalo farm owners in fellow land and low-lying lands and local road sides. Quality bull and semen will give birth of healthy calves of the conceived buffalo cows under different categories of commercial buffalo dairy farms. But the AI facilities not yet developed

adjacent of the study area and AI technicians should train up to recover these problem and about 74.28% farmers reported to ensure quality semen. Diseases hardly affect the herd productivity of the dairy farms and reduced the economic profitability of the farms.

Thus to make sustainable the opportunities of veterinary services and health care facilities should be available by Govt. and private level simultaneously and almost 100% farmers reported to ensure veterinary services, low or interest credit facilities.

Table 5. Suggested measures to improve rearing system of buffalo by categories of buffalo Enterprises and herd Size

Particulars of Suggestive Measures	Response to owners with categories Buffalo by herd Sizes		
	Herd Size-1 (< 30 Buffalos) N=20	Herd Size-2 (> 30 Buffalos) N=15	*All N=35
Providing incentives in price with supply of quality feeds and fodder.	20(100.00)	15(100.00)	35(100.00)
Preventive measures against natural calamities	18 (88.0)	12(80%)	30 (85.71)
Supply of quality semen and skilled AI personnel.	12(48.00)	14(93.33)	26(74.28)
Provides adequate Veterinary services and health care Facilities.	20 (80.00)	15 (100.00)	35(100.00)
Ensure proper feeding, housing and management practices	12 (68.00)	13 (86.67)	28(71.42)
Provides proper training & Extension services	14 (70.00)	15 (100.00)	29 (82.85)
Supply of low/free interest credit facilities	20(100)	15(100.00)	5(100.00)

*Figures in the parentheses indicates percentage

It could be concluded that the owners of buffaloes of the coastal areas of Bangladesh do not rear their buffaloes in a scientific way rather than following traditional ways. The research showed that the reproductivity and productivity of the buffaloes were almost regular comparing with other published reports. Proper feeding, housing, veterinary services, the sound breeding programs are necessary to improve genotype of these indigenous buffaloes. However, as the research was fresh of its type in these areas, a well planed widespread investigation should be made for identifying the existing problems and possible solutions of buffalo rearing for further development by the initiatives (like sufficient Matirkilla for disaster management, govt. pasture land in khas land and new arise Char, Proper strategic deworming, mass

vaccination as well as veterinary coverage, improve AI facilities for getting rid of inbreeding problem, etc.) of Government and respective NGOs in the study areas.

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