International Journal of Advanced Education and Research
ISSN: 2455-5746
Impact Factor: RJIF 5.34
www.alleducationjournal.com
Volume 2; Issue 5; September 2017; Page No. 62-67

Integrated farming system for Helmand province, Afghanistan

Ali Ahmad, Dinesh Kumar, Naqibullah Mujadidi, Baryalai Rafi, Mohammad Khan Wasifhy
Sam Higginbottom University of Agriculture, Technology and Sciences Allahabad, Uttar Pradesh, India

Abstract
A study on Integrated farming system for Helmand Province, Afghanistan was carried out in Helmand Province. Helmand province was selected purposively as it has highest area under various crops production.To suggest some policies measures in order to improve the production the study was conducted in 14 districts of the province.An attempt has been made in this study to examine the current farming systems of the province and estimated the possible increments in production and productivity by judicially adopting suitable integrated farming systems techniques. The specific objectives of the study areestimating crop production of cereals, oilseed, industrials, vegetable and fruit including average yield per hectare as well as total yield in metric tonnes. The primary data are collected from Helmand Department of Agriculture, irrigation and live stock. The whole information is related to the crop year 2016.The finding of the study revealed that the Helmand Integrated farming systemcan be divided in the northern (orchards, irrigation from underground water) and the southern (principally field crops and surface water irrigation). The third farming system is the Kuchi livestock keeping system, whereby there are long range Kuchi people of community migrating into Farah, Uruzgan and the shorter range Kuchi, who basically live in and around Registan. It is estimated that by judicially adopting suitable Integrated Farming Systems techniques the agricultural production can be increased by another 50% by 2050 so as to meet the need of the increasing population of this region.

Keywords: integrated farming system, helmand province, Afghanistan

Introduction
Helmandor Hillmand is one of the 34 provinces of Afghanistan, in the south of the country. The province contains 14 districts, encompassing over 1,000 villages, and roughly 879,500 settled people. Lashkargah serves as the provincial capital. Helmand Province has irregular highlands which gradually increase in elevation in the northern and southern parts of the province. The Helmand River is the longest river in Afghanistan and it flows through the center of the province. The Helmand River Valley Project provides river and canal irrigation for approximately 150,000 hectares.The northern part of the province does not have direct access to the river and relies on irrigation water from natural springs and groundwater that flow into karezes. Deep tube wells have been dug in the north to offset the decrease in kareze irrigation due to drought, which has led to depletion of groundwater supplies. Helmand province has an estimated population of 850,000 residents, and 94% is rural. Pashtun tribes constitute over 90% of the ethnic population with the balance being primarily Baluchs who reside in the southern part of the province. The literacy rate in Helmand is about 5% with women representing only 1% of the total. The Kuchi population is virtually illiterate and numbers around 100,000 in the winter with about 20% being settled. Helmand agriculture has a history of strong production due to the extensive irrigation system built by the United States over 40 years ago. Field crops such as wheat, barley, maize, and mung beans are produced where irrigation is supportive. The climatic environment is favorable to double cropping (winter and summer crop on same land) throughout the province. Industrial crops such as cotton, peanuts, and now soybeans are grown on a limited scale due to the lack of processing capacity. Vegetable production is almost exclusively subsistence based with some surplus being sold locally. Fruit and nut cultivation exists, but not on a large commercial basis and is predominate in the northern zone of the province that is served by kareze and well irrigation. Livestock and poultry are raised throughout the province for local consumption. A farmer would be considered a laborer if he farms for the landowner and is provided with shelter and paid with money and goods. Bazgari or sharecropping is very common where the landowner supplies the land and some percentage of inputs. The agreement will stipulate the percentage of harvest the farmer will retain based on the amount of investment by the landowner in seed, fertilizer, fuel, machinery and the agreed upon value of the land. If the farmer only contributes his labor; the normal sharecrop rate would be 20 – 25% of the yield. A third contract option is utilized where a lease is created allowing for a longer term agreement of up to 5 years for a set rental rate or an amount of commodity produced on the land. This method is particularly favored for horticultural production from orchards.

What is Integrated Farming System
Farming system is a mix of farm enterprises such as crop, livestock, aquaculture, agroforestry and fruit crops to which farm family allocates its resources in order to efficientlymanage the existing environment for the attainment of the family goal.

Principles of Integrated farming system

The key principles of Integrated farming systems are (i) Minimization of risk, (ii) Recycling of wastes and residues, (iii) Integration of two or more enterprises, (iv) Optimum utilization of all resources, (v) Maximum productivity and profitability (vi) Ecological balance (vii) Generation of employment potential (viii) Increased input use efficiency (ix) Use of end products from one enterprise as input in other enterprise

Characteristics of Integrated farming system

The main characteristics of Integrated farming system are (i) Farmer oriented & holistic approach, (ii) Effective farmers participation (iii) Unique problem solving system (iv) Dynamic system, (v) Gender sensitive,(vi) Responsible to society,(vii) Environmental sustainability,(viii) Location specificity of technology, (ix) Diversified farming enterprises to avoid risks due to environmental constraints, (x) Provides feedback from farmers.

The present farming system of Helmand province, Production and Productivity

Winter wheat is the predominant cultivated crop for Helmand. Barley is also a winter grain crop that is produced on a smaller area, but is an important crop. Maize (corn) is the largest crop produced in the summer. Wheat, barley, and corn are all grain crops which are critical to food security. They are grain crops that produce maximum levels of storable food per hectare. This is an extremely important fact to realize when considering any shifts in production in the Helmand agricultural system. Certified seed for wheat and barley is critical for good yield potential. Hybrid corn seed is a must for acceptable production. Quality seed and nutrient management are opportunities for improvement in the Helmand agricultural system.

Industrial crops are oilseed crops such as cotton, peanuts and soybeans. These are also high protein commodities which would supplement human nutrition as well as enhance livestock and

Poultry production. Peanuts and soybeans are legumes which fix their own nitrogen making them excellent rotation crops providing some nitrogen for the following winter grain crop. Cereal, industrial and other crops production detail in district wise are presented in the following table.

Table 1: Districtwise Cereal and other Crops Production of Helmand Province - 2016

No.	Crop	District wise area of crop (ha)														Total Area (Ha)	Average Yield per Ha (mtons)	Total Yield (mtons)
		Nawa	Garamsir	Khanishin	Dishu	Lashkargah	Nad Ali	Marja	Nahresiraj	Sangain	Musa Qala	Kajaki	Nowzad	Baghran	Washir			
1	Maize	7000	7500	2200	,,	4500	5000	800	13000	5000	1200	2500	6000	,,	5500	60200	4.9	294980
2	Wheat	8900	16500	7500	,,	9800	14000	25000	17000	8000	7000	3500	9000	,,	7000	133200	4.5	599400
3	Barley	45	600	2300	,,	880	200	6000	800	200	600	600	120	,,	800	13145	2.5	32862.5
4	Tobacco	20	5	2	,,	,,	2	20	21	20	10	7	50	,,	50	207	12	2484
5	Cotton	720	450	1700	,,	330	4000	15000	,,	,,	300	30	,,	,,	70	22600	4	90400
6	Basil	2	550	110	,,	450	5000	700	100	,,	100	150	,,	,,	,,	7162	1.7	12175.4
7	Soybean	4	520	,,	,,	12	45	,,	,,	,,	,,	,,	,,	,,	,,	581	3.1	1801.1
8	Peanut	,,	3	7	,,	,,	4000	3000	,,	,,	,,	,,	,,	,,	,,	7010	4	28040
9	Cumin	45	600	750	,,	3	70	120	200	,,	95	100	90	,,	120	2193	2.5	5482.5
10	Sesame	160	300	700	,,	15	150	700	150	,,	200	10	40	,,	150	2575	2	5150
11	Mung (Black)	1400	105	110	,,	280	500	,,	2700	800	250	150	900	,,	5	7200	1.5	10800
12	Mung (Green)	60	750	800	,,	500	200	700	30	200	300	200	300	,,	20	4060	1.5	6090
13	Bean (White)	320	,,	,,	,,	20	,,	10	100	160	25	12	150	,,	10	807	2	1614
14	Bean (Red)	,,	,,	,,	,,	650	,,	20	100	100	30	3	100	,,	,,	1003	2	2006

DAIL (Department of Agriculture, Irrigation and Livestock)

Vegetable Production

Vegetables are grown almost exclusively for subsistence in compound gardens. Centralized grading and packing facilities do not exist in key production zones which would need to be supported by vegetable producers associations for commercial production to be viable.Common vegetables grown in Helmand province are, chili, carrots, watermelon, onion, cabbage, cauliflower, turnip, tomato, spinach, radish, okra, eggplant, cucumber, leek, coriander, pumpkin, squash and etc. Vegetable production detail in district wise are presented in the following table.

Table 2: District wise Vegetable Production of Helmand Province – 2016]

No.	Crop	District wise area of crop (ha)														Total Area (Ha)	Average Yield per Ha (mtons)	Total Yield (mtons)
		Nawa	Garamsir	Khanishin	Dishu	Lashkargah	Marja	Nad Ali	Nahresiraj	Sangain	Musa Qala	Kajaki	Nowzad	Washir	Baghran			
1	Watermelon	255	650	110	,,	150	300	100	6000	2500	250	120	400	20	,,	10855	35	379925
2	Melon	65	600	90	,,	145	250	75	600	2000	150	80	500	17	,,	4572	28	128016
3	Cucumber	60	200	15	,,	160	120	18	500	1000	250	60	500	5	,,	2888	10	28880
4	Tomato	108	440	3	,,	55	150	15	450	900	300	50	800	20	,,	3291	30	98730
5	Eggplant	52	200	3	,,	50	145	20	250	600	60	70	700	10	,,	2160	27	58320
6	Okra	118	700	5	,,	65	200	25	500	800	200	60	100	30	,,	2803	15	42045
7	Pumpkin	16	50	5	,,	14	100	15	90	200	4	9	50	5	,,	558	16	8928
8	Squash	10	,,	10	,,	13	90	10	30	80	50	12	60	40	,,	405	11	4455
9	Chili	5	20	1	,,	8	50	25	50	70	45	3	20	10	,,	307	7	2149
10	Cauliflower	,,	7	,,	,,	18	,,	25	12	50	55	,,	190	,,	,,	357	6	2142
11	Radish (White)	15	20	10	,,	4	25	10	7	90	60	9	100	5	,,	355	20	7100
12	Radish (Red)	5	5	3	,,	11	25	10	6	80	80	4	70	2	,,	301	11	3311
13	Cress	10	,,	3	,,	12	12	18	6	90	90	3	10	1	,,	255	13	3315
14	Coriander	,,	,,	5	,,	11	11	15	11	100	40	2	100	2	,,	297	13	3861
15	Spinach	20	40	10	,,	10	30	17	16	400	7	9	100	10	,,	669	14	9366
16	Carrot	20	23	9	,,	11	100	25	30	200	40	40	300	50	,,	848	14	11872
17	Leek	5	5	2	,,	12	5	15	400	40	,,	2	80	5	,,	571	12	6852
18	Onion	60	150	25	,,	9	,,	16	200	180	35	25	80	20	,,	800	42	33600
19	Garlic	5	4	10	,,	,,	10	25	100	,,	,,	,,	,,	40	,,	194	16	3104
20	Turnip	5	10	6	,,	5	80	18	30	100	9	20	100	20	,,	403	35	14105

DAIL (Department of Agriculture, Irrigation and Livestock)

Fruit Production:

Commercial fruit production is increasing due to efforts of many donor organizations. However, as the chart below indicates; only a minimal amount of production exists. Orchards are principally in Northern Helmand (almonds, apricots, pomegranates and grapes), but nursery production is viable in the central districts. Recognizing the limitation of high value fruit production as an alternative to poppy is a critical concept that must be accepted. Fruit production detail in district wise are presented in the following table.

Fig 3: District wise Fruit Production of Helmand Province – 2016

No.	Crop	District wise area of crop (ha)														Total Area (Ha)	Average Yield per Ha (mtons)	Total Yield (mtons)
		Nawa	Garamsir	Khanishin	Dishu	Lashkargah	Nad Ali	Marja	Nahresiraj	Sangain	Musa Qala	Kajaki	Nowzad	Baghran	Washir			
1	Grape	200	800	60	,,	500	100	62	1200	900	850	50	459	,,	30	5211	15	78165
2	Pomegranate	45	80	15	,,	25	30	68	180	1000	50	20	1100	,,	50	2663	22	58586
3	Apricot	12	10	12	,,	20	45	,,	80	500	30	10	500	,,	40	1259	14	17626
4	Peaches (Shaftalow)	10	80	11	,,	36	45	77	80	400	20	12	100	,,	50	921	20	18420
5	Peaches (Alocha)	33	100	7	,,	35	50	25	60	90	50	14	60	,,	70	594	28	16632
6	Peaches (Plum)	5	5	1	,,	11	35	15	50	70	40	11	70	,,	30	343	12	4116
7	Peaches (Alobokhara)	10	30	2	,,	30	40	,,	60	70	35	15	50	,,	50	392	30	11760
8	Peaches (Geringech)	50	60	2	,,	35	40	30	80	80	50	20	40	,,	50	537	32	17184
9	Almond	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	421	,,	,,	421	1.7	715.7
10	Apple	10	7	9	,,	,,	40	,,	80	30	100	20	40	,,	70	406	18	7308
11	Pig	5	10	1	,,	,,	25	,,	80	50	40	30	50	,,	60	351	14	4914

DAIL (Department of Agriculture, Irrigation and Livestock)

Livestock and Poultry

Farmers raise milking cows, sheep, goats, donkey and chickens for producing of milk, meat, eggs for family consumption and market and transportation. Helmand has water, forages and pastures which is conducive to livestock production for both Kuchi and static farmers. Chickens, ducks, and turkeys are raised for domestic consumption with any surplus of chicken eggs produced being sold by the women of the households.

Table 4

Helmand	Percentage Owned Household (HH)		Number of Animals		Avg Herd/Flock Size per HH	
Animal	Kuchi	Rural	Kuchi	Rural	Kuchi	Rural
Cattle	6	57	222	219456	1	1.9
Oxen	0	6	0	17064	0	1.4
Horses	0	2	0	8856	0	2.3
Donkeys	88	21	9879	47736	3.2	1.1
Camels	31	0	5550	216	4.3	1.2
Goats	97	45	133866	943488	5	1
Sheep	94	57	110445	1114344	33.2	9.6
Poultry	91	71	29637	1793232	9.2	12.5

Fisheries

Helmand has got very good capacity for fishery, but fish farms are not yet common in large quantity, very less farmers started fish farming recently, however, fishing is a good business for number of people in the province in particular in Grishk and other parts located along the Helmand River.

Dairy

Milk production is an important subsistence activity throughout Helmand. Cattle, sheep and goats are milked for human consumption. Although forage production does exist; the amount of land available limits the number of animals that can be maintained. The shortage of protein feeds will limit productivity of dairy animals and must be addressed in the future. The Bolan Dairy Farm was started with the objectives of breeding, production and processing. The farm has adequate resources for forage and pastures and may have the capacity for investment as a part of a larger agricultural development plan. The facility could support the development of small farmer dairy production with central facilities for veterinary care, breeding services, extension training and milk processing.

Salient Recommendation to potentializing the exiting farming system of Helmand to meet food and energy requirements for future

Agricultural production in Helmand could expand significantly with greater use of improved inputs. Considering all major crop productivity to be increased. Providing the following opportunities and practices with an Integrated Farming Systems approach would make it possible to attain and sustain such targets in the agricultural sector of Helmand:

1. Using of non-productive cultivable land which may be used in grain, horticultural, agro forestry and fodder crops: The release of unproductive land has the potential to provide for a very significant increase in production of field and horticulture crops.
2. Increasing yield per unit area on presently available cropped land: As whole low access to modern technologies and low level of mechanization is one of the serious challenges in agriculture sector. It is possible that yield improvements would be achieved with little net increase in crop inputs.
3. Genetic improvement: Yields of new varieties of maize, wheat or any other crop will increase significantly if those could be released in the region. There are several factors which may be influencing the rate of genetic gain in crops species such as pest and disease resistance; initiation of physiological and genetic researches of cultivated crops, improve resource use efficiency mainly nitrogen, releasing of higher yield varieties, higher quality varieties and investment in private breeding program.
4. Irrigation: Necessary research to be carried out to quantify the potential yield loss due to absence of modern systems of irrigation systems in this province. Significant investment requires to modernized irrigation system to prevent exiting water wasteful system, and this tend to be more useful in increasing of field and horticultural crops.
5. Fertilizing: Chemicals play an important role in increasing of productivity of field crops. Subsidy or reduced fertilizer prices available to the farmers with appropriate soil nutrient management techniques will increase the production significantly. Fertilizer prices have risen rapidly of late, driven by a dramatic increase in global demand as well as by increases in cost of the natural gas from which nitrogen fertilizer is manufactured.
6. Residue decomposition on productivity and soil fertility: Aerobic decomposition of crop residues (about 50% of the C within 30–40 cm depth), can increased N availability, and reduced CH_4 emissions. The immediate incorporation of crop residues before planting the next crop is causing lower grain yields than that applied after composting or vermicomposting. In this case, the timing of incorporation of crop residues is more important than the quantity. In addition, residue incorporation resulted in considerable increases in soil organic matter content and soil K supply, which would lead to favorable nutrient balances and improved yields.
7. Raising more animals for more income and manure: Applying of animal manure and compost will be the most useful approach of increasing crop production. This will enhance saving on mineral fertilizer inputs that also can be a means of limiting economic risks for farmers.
8. Crop rotation: Crop rotation is widely recognized as a useful tool for weed, disease and insect management as well as soil health and nutrient management and the positive effects of varying crop sequences on crop yields. Diversified crop rotations have been observed to increase overall yield, provide more stable profits over time and reduce input requirements. Including legumes in rotation may have a relatively large impact due to biological nitrogen (N) fixation and the accompanying reduction in N fertilizer requirements.
9. Introduction of fodder crops: Fodder millet and sorghum and other fodder crops is not commonly being cultivated

in Helmand. Therefore there is a need to educate the farmers on this.

10. Developing modernized animal farms for production milk by higher yielding breeds of milch animals.
11. Well-managed dairy farm units should be constructed in the rural areas to provide the pasteurized dairy products to the urban areas as well.

The above mentioned recommendations with suitable adjustment will help to achieve the target in production for 2050 including cereals, industrial, vegetable, fruit and other crops as shown in the following table.

Table 5: Production and productivity statistics of Helmand Province of cereal, fruit and vegetable crops during 2016 and estimated projected yield increase for the years 2050

No.	Crop	Total Area (Ha)	Yield kg/Ha	Total Yield (mtons)	Production (mtons)	Productivity kg/Ha
					50% increase by 2050	50% increase by 2050
1	Maize	60200	4900	294980	442470	7350
2	Wheat	133200	4500	599400	899100	6750
3	Barley	13145	2500	32862.5	49293.8	3750
4	Tobacco	207	12000	2484	3726	18000
5	Cotton	22600	4000	90400	135600	6000
6	Basil	7162	1700	12175.4	18263.1	2550
7	Soybean	581	3100	1801.1	2701.65	4650
8	Peanut	7010	4000	28040	42060	6000
9	Cumin	2193	2500	5482.5	8223.75	3750
10	Sesame	2575	2000	5150	7725	3000
11	Mung (Black)	7200	1500	10800	16200	2250
12	Mung (Green)	4060	1500	6090	9135	2250
13	Bean (White)	807	2000	1614	2421	3000
14	Bean (Red)	1003	2000	2006	3009	3000
15	Grape	5211	15000	78165	117248	22500
16	Pomegranate	2663	22000	58586	87879	33000
17	Apricot	1259	14000	17626	26439	21000
18	Peaches (All varieties)	2787	24400	68112	102168	36600
19	Almond	421	1700	715.7	1073.55	2550
20	Apple	406	18000	7308	10962	27000
21	Pig	351	14000	4914	7371	21000
22	Watermelon	10855	35000	379925	569888	52500
23	Melon	4572	28000	128016	192024	42000
24	Cucumber	2888	10000	28880	43320	15000
25	Tomato	3291	30000	98730	148095	45000
26	Eggplant	2160	27000	58320	87480	40500
27	Okra	2803	15000	42045	63067.5	22500
28	Pumpkin	558	16000	8928	13392	24000
29	Squash	405	11000	4455	6682.5	16500
30	Chili	307	7000	2149	3223.5	10500
31	Cauliflower	357	6000	2142	3213	9000
32	Radish (White)	355	20000	7100	10650	30000
33	Radish (Red)	301	11000	3311	4966.5	16500
34	Cress	255	13000	3315	4972.5	19500
35	Coriander	297	13000	3861	5791.5	19500
36	Spinach	669	14000	9366	14049	21000
37	Carrot	848	14000	11872	17808	21000
38	Leek	571	12000	6852	10278	18000
39	Onion	800	42000	33600	50400	63000
40	Garlic	194	16000	3104	4656	24000
41	Turnip	403	35000	14105	21157.5	52500

Conclusion

To suggest some policies measures in order to improve the production the study was conducted in 14 districts of the province. An attempt has been made in this study to examine the current farming systems of the province and estimated the possible increments in production and productivity by judicially adopting suitable integrated farming systems techniques. The specific objectives of the study are estimating crop production of cereals, oilseed, industrials, vegetable and fruit including average yield per hectare as well as total yield in metric tonnes. The primary data are collected from Helmand Department of Agriculture, irrigation and livestock. The whole information is related to the crop year 2016. The finding of the study revealed that the Helmand Integrated farming systemcan be divided in the northern (orchards, irrigation from underground water) and the southern (principally field crops and surface water irrigation). The third farming system is the Kuchi livestock keeping system,

whereby there are long range Kuchi people of community migrating into Farah, Uruzgan and the shorter range Kuchi, who basically live in and around Registan. It is estimated that by judicially adopting suitable Integrated Farming Systems techniques the agricultural production can be increased by another 50% by 2050 so as to meet the need of the increasing population of this region.Improving nutrient efficiency is a worthy goal and fundamental challenge facing the fertilizer industry, and agriculture in general. IFS is also an eco-friendly approach in which waste of one enterprise becomes the input of another thus making efficient use of resources. It helps in improving the soil health, weed and pest control, increase water use efficiency and maintains water quality. As this system minimizes the use of harmful chemical fertilizers, weed killers and pesticides and thus safeguards the environment from the adverse effects. To achieve the goals and target in the future years, needs systematic long term research, planning, implementation, monitoring and evaluation. A team of scientists with farmer leaders, NGOs and policy makers has to be deputed from all concerned departments and agricultural universities especially Helmand University to accomplish this task. The team has to study on the existing natural resources and farming systems management scenario of the province and identify ways and develop location specific sustainable integrated farming systems projects for the Province to achieve the estimated agricultural production and productivity for 2050.

References:

1. GOI. State of Indian agriculture, Ministry of agriculture, Department of agriculture and cooperation, Directorate of economics and statistics, New Delhi, 2012-13.
2. GOI. Hand book on horticulture statistics, Ministry of Agriculture, Department of Agriculture and Cooperation, New Delhi, 2014.
3. GOI. Department of Agriculture & Cooperation, Ministry Of Agriculture, Government of India Directorate of economics Statistics, 2014. *http :/www.agriccoop.nic.in.*,
4. Gupta V, Rai PK, Risam KS. Integrated crop-livestock farming systems: A strategy for resource conservation and environmental sustainability. Indian research journal of extension education. 2012; Special issue2:49-54.
5. Lal R, Miller FP. Sustainable farming for tropics. In: Singh, R.P. (Ed.) Sustainable agriculture: issues and prospective. Indian Society of Agronomy, IARI, New Delhi. 1990; 1:69-89.
6. Livestock thematic papers tools for project design integrated crop-livestock farming systems. International fund for agricultural development. Website at *www.ifad.org/lrkm/index.htm.*
7. Singh Kalyan, Bohra JS, Singh TK, Singh JP, Singh Yogeshwar, Singh CS. Productivity and economics of integrated farming system in irrigated agro ecosystem of Eastern Uttar Pradesh. Indian Journal of Agronomy. 2007; 52 (1):11-15.
8. Tiwari PN. Integrated farming research for sustaining food production. Journal of Nuclear Agriculture Biology. 1993l; 20:1-13.
9. Zain ullahStanakzai. "300 casualties inflicted on rebels in Musa Qala: Governor". Pajhwok Afghan News, 2015. Retrieved August 15, 2016.
10. Hillmand Province. *Government of Afghanistan and United Nations Development Programme (UNDP).* Ministry of Rural Rehabilitation and Development. Retrieved 2012-12-27.
11. Jarrige JF, Didier A, Quivron G. Shahr-iSokhta and the Chronology of the Indo-Iranian Borderlands. Paléorient. 2011; 37(2):7-34 academia.edu
12. Kochhar, Rajesh. 'On the identity and chronology of the Ṛgvedic river Sarasvatī' in Archaeology and Language III; Artefacts, languages and texts, Routledge, 1999. ISBN 0-415-10054-2.
13. Smith, Michael. "British troops in secret truce with the Taliban". The Times. London, 2006. Retrieved 2010-05-04.