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EDITORIAL



IN THE NAME OF ALLAH (SWT), THE MERCIFUL, THE BENEFICIENT.

The Editorial Board (EB) of Pak. Journal of Livestock Sciences (P.JLSc.) accorded approval of this Vol-VII, No.07 in our two meetings on 8th July and 20th of December, 2015 with amendments/changes as came into offing.

A total of nine (09) papers were received four (04) of out of which pertain to Environmental Sciences, two (02) in Agricultural Sciences, two (02) in Livestock Sciences and one (01) on Education. Immediate action was taken to request Environmental and Education Scientists including subject specialists in the subjects of bio-technology, to be added to the Board of Editors and still ahead experts were enlisted as subject referees, including Prof. M. Ibrahim as International Referee, a Sri-Lankan, from International Livestock Research Institute (ILRI), at NARC, Islamabad.

As PJLSc. Recognition case is in final stages at Higher Education Commission (HEC), Quality Assurance Section, we have requested since Vol-VI of 2014 and this Volume-VII of 2015 be subjected to filtration through their system turntin, for plagiarism, if any.

All the Abstracts of PJLSc. from Vol-I of (2009) to Vol-VI (2014) have been included in the National Indexing and Abstracting Services (NIABS), an ISBN-Regd. Subsidiary joint effort of Livestock Development Foundation (LDF) and Pak.JLSc. while this volume (Vol-VII) will also be indexed and abstracted.

The Editorial Board, in the light of appreciations telephonic messages, SMS, E-mails and verbal requests from various organizations as well as the pressing demands of graduate students both at M.Sc(Hons)/M.Phil and Ph.D level of various Universities including post graduate researchers of different institutions of the country with special reference to influx of research papers/articles, have decided to publish PJLSc twice a year (B1-Annual), immediate after the formal recognition by the HEC and possible financial assistance.

We are now able to develop our website www.Pak.JLSc.Org.

Dr. Muhammad Hafeez
Chief Editor

**INCREASED AGRICULTURAL PRODUCTION, BY THE YEAR 2030:
A FUTURISTIC APPROACH IN PAKISTAN**

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ABSTRACT

This research cum review article describes the recent three year's comparative trend of major crop production namely wheat, rice, maize, cotton, sugar cane, oil seed availability (both local and imported) for the year 2013-14, based on the data of crops produced in the Country Pre-emptive forecasted target for the year 2015, 2020, 2025 and 2030 have been indicated, keeping an eye over the population boom for these years as 197.2, 201.12, 227.26 and 242.06 millions in the light of Agricultural growth of 3.2% in 2012-13 and 2.7% in 2013-14. The paper also provides data on water sector developments, in providing water for irrigation as well as financial assistance/agriculture credit to farmers. The credit provided to 1.5 million agricultural farmers was to the tune of Rs.255.7 Billions (Bns.) (July to March, 2014) which was 67.3% of the annual target of Rs.380 (Bns.) as described by Government of Pakistan Commercial, Banks and ZTBL collectively in the light of recommendations of Agriculture Credit Committee (ACC) of State Bank of Pakistan not only for our people but controlled exports of surplus items. The wheat produced, was grown on 8.69 million hectares (hecs) in the year 2012-13 as compared to 8.65 (hecs) in 2011-12 with an increase of 0.5%. The production of wheat had been 23.5, 24.2 and 25.28 million tons in 2011-12, 2012-13 and 2013-14 respectively. This is forecasted to be produced to the tune of 27.2, 30.5, 35.8 and 40.2 million tons in the year 2015, 2020, 2025 and 2030 respectively. Rice was produced as 6.16, 6.90 and 6.8 million tons in the year 2011-12, 2012-13 and 2013-14 and is expectedly be produced to the tune of 7.6, 8.04, 8.86 and 9.15 million tons for the years 2015, 2020, 2025 and 2030 respectively. Maize on the other hand was shown on 1.085 million (hec.) producing 4.5 million tons in the year 2013-14 (if the area under Maize cultivation is increased by 1.25, 1.46 and 1.56 million tons with a steady increase of 2.7% in the coming years, we can get 4.64, 4.78, 4.82 and 4.95-5.1 million tons in the year 2015, 2020, 2025 and 2030 respectively. Sugar cane has also shown a steady increase in the years 2011-12, 2012-13 and 2013-14 produced to a total of 58.4, 63.75 and 56.6 million tons with a yield per (hec.) of 55.19, 54.6 and 56.60 (thousand) kgs in these years respectively. Main oil seeds produced were cotton seed, rape seed/mustard seed, sunflower and canola. From Cotton seed the oil extracted was 12.23%, rape seed/mustard seed gave 30.56% oil while sunflower and canola (although cultivated on very less area of land) gave us 38.29% and 37.60% oil on an average. The total production of these oil seeds and oil extracted for the years 2011-12, 2012-13 and 2013-14 is detailed in the paper. The paper ends with recommendations of increased production of grain crops not only to meet our country's requirements but also to reduce the import bill of Rs.216 Bns., each year, on edible oil import alone.

Keywords: Agriculture crop production, targets 2030 Pakistan

INTRODUCTION:

An important topic was under discussion in the Editorial Board of Pakistan Journal of Livestock Sciences (PJLSc.), Islamabad in which food crops and grains required by our people, in Pakistan were the targets to estimate amidst population boom, in the light of recent three years data of 2011-12, 2012-13 and 2013-14 and the targets by the year 2030 and beyond. It was also pointed out that ways and mean be explored for increased production, this was the endeavor made by authors. The population boom, as estimated by the National Institute of Population Studies

(NIPS), Islamabad indicated that human population will reach 191.72, 210.12, 227.26 and 242.06 millions in the coming years 2015, 2020, 2025 and 2030 respectively. We must target our food requirement from agricultural grain crops namely wheat, rice, maize, cotton and sugar cane specially the oil seed crops; to reduce our import bill of edible oil which amounted to Rs.216.4 Billions (Bns.) in 2011-12. In the year 2012-13 (July-2012 through March-2013) a total of 1.74 million tons of edible oil was imported with a total cost of Rs.153.3 Bns. while the local production of edible oil was only 0.612 million tons. The agricultural growth have been encouraging as 3.3% in the year 2012-13, as compared to 02% in the year 2010-11, out of whole agriculture, the (i) important crops showed a growth of 2.3% and (ii) other crops showed 6.7% growth. Livestock on the other hand showed 3.7% growth in 2013, with most of the environmental condition favourable.

Efforts have also been made to work out the future financial support to farmers, subsidy on acquiring recent technologies, emphasizing means and measures for increased agricultural product for our people and controlled exports.

This research cum review paper was attempted, keeping the following of the objectives, in mind, of this assignment:

- i. To review the comparative situation of agricultural crops (namely wheat, rice, maize, sugar cane) used for food, produced in the three years (2011-12, 2012-13 and 2013-14).
- ii. To review the comparative production of oil seed crops (namely cotton seed, rape seed/mustard, sunflower and canola) during the recent three years.
- iii. To find out the edible oil produced/extracted from the four oil-crops and find out means and ways to achieve the target of total edible oil imported, to reduce the import bill of imported edible oil of Rs.170 Bns. to Rs.180 Bns. each year.
- iv. To assess the requirement of agricultural products needed to the year 2030 and beyond amidst population boom of 240 millions in the targeted year.

MATERIAL AND METHODS:

- i. Most of the reports on agricultural crops, oilseed crops and project reports for the years 2011-12, 2012-13 and 2013-14 were excessively consulted.

- ii. Data available in agriculture stats at home and abroad was re-visited, including Pakistan Bureau of Statistics, for the period under report.
- iii. Pak. Economic Survey Reports, for the period under report, was also consulted. Recommendations from various seminars/symposia/conferences and workshops were also reviewed and results taken.
- iv. Various Journals of the country were also consulted and data taken.

CROP WISE INFORMATION:

- a. **Wheat** is an essential item of our diet, as staple food, its production was 24.2 million tons in 2012-13 and 25.28 million tons in 2013-14 as compared to 23.5 millions tons in 2011-12, with a positive growth of 2.7%. The support price of wheat was Rs.1200/- per 40 kgs in the year 2013 which has been increased to Rs.1300/- in 2014. The incentive for farmers will encourage them towards sustained offer, rather grow more.

The targets worked out for wheat for the years 2015, 2020, 2025 and 2030 would be very close to 27.2, 30.50, 35.8 and 40.2 million tons respectively, if the area under cultivation is increased from 8693 hecs. in 2013-14 to 8730, 8780, 8830 and 8900 for the target years above respectively, given the constants as regular, namely (i) national environment (ii) financial assistance (iii) availability of fertilizer and Pesticides on subsidized rates including (iv) provision of solar-energy pumps (v) low electricity rates and (vi) improved seed varieties.

Wheat crop annually contributes 10.1-10.2% to the value added in agriculture and 2.2%-2.25% to GDP. The area under wheat was increased from 8650 in 2011-12 to 8693 thousand hec. In 2012-13 (with an increase of 0.5%) which is still expected to increase in 2014-15.

- b. **Rice** being the important cash crop and second grain crops as staple food, comprises 40% fine (Basmati) and 60% course type, is mainly grown to meet country's requirements and export. It has been counted as contributing 2.7% to agriculture value addition but only 0.6% in GDP. Rice was grown on 2311 thousand hec. In 2012-13 while it was grown on 2571 thousand hec in 2013-14. The production was 5541 thousand tons (5.54 millions tons) against targeted 6900 thousand tons (6.9 million tons) in 2012-13 presented in table No.1.

- c. **Maize** is one of the important grain crops of Kharif season, contributing 2.2% to agriculture value added and 0.5% to GDP. It was shown on 1085 thousand hecs. in 2012-13, producing 4.22, 4.13 and 4.527 million tons for the years 2011-12, 2012-13 and 2013-14 respectively. The per hec. yield being 4268 kgs (Table No.01). Maize is hardly sufficient for domestic use in human food and animal feed but this can be increased in Barani as well as Irrigated areas for fodder as well as grains if sown on increased land say 108, 1.25, 1.46 and 1.56 million hecs and expectedly in the years 2015, 2020, 2025 and 2030 respectively.
- d. **Sugar** cane is an important crop, mostly used for production of cane sugar for our domestic use, by-products for paper industry and making ethanol etc. it was cultivated on 1124 thousand hecs. producing 62.5 million tons, showing an increase of 07% over the per hecs. yield of 55,580 million kgs in 2012-13, as presented in table No.01.
- e. **Oil seed crops** namely: (i) cotton seed production remained on the top, was 3.21 million tons and 3.39 million tons for the years 2011-12 and 2012-13 respectively producing cotton seed oil to the tune of 0.38 million tons and (407thousand tons 0.407) million tons for these two years. (ii) The second oil seed crop is sunflower. Its production was 473 thousand tons and 378 thousand tons for the years 2011-12 and 2012-13 respectively, producing sunflower oil to the tune of 179 thousand tons and 140 thousand tons, for these two years (Table No.02).

The wheat produced in the country for 2011-12, 2012-13 and 2013-14 was 23.50, 24.20 and 25.50 while it is expectedly fore-casted to the tune of 27.20, 30.50, 35.80 and 40.20 million tons in the year 2015, 2020, 2025 and 2030 respectively. Rice on the other hand was produced as 6.16, 6.90 and 7.45 million tons in the year 2011-12, 2012-13 and 2013-14 and is expectedly forecasted to the tune of 7.60, 8.04, 8.86 and 9.15 million tons in the years 2015, 2020, 2025 and 2030 respectively.

The local production of oil was 0.636 million tons while import of edible oil was 2.148 million tons. The total availability, as our domestic requirements, was 2.748 million tons. The import bill during 2011-12 was Rs.216.4 billions. In the year 2012-13 (July-March) 1.738 million tons of edible oil was imported with a cost of Rs.153.3

Bns. while the local production was 0.612 million tons only. The production of oil seed of four crops along-with oil extracted is presented in table No.02.

The trend of growing oil seed crops such as sun flower, rape-seed/mustard and canola have shown increase in production which needs to convince farmers to grow these oil seed crops on an increased area of their lands, so that our import bill of edible oil is reduced steadily over a period of 05-06 years, say 2020 and onwards.

Population Boom.

The present number of human population in 2013-14 was 184.3 millions while this is in increasing mode by 197.72, 210.12, 227.26 and 242.06 millions in the years 2015, 2020, 2025 and 2030, as reported by National Institute of Population Studies (NIPS), Islamabad. The population in urban areas was 69.87 millions and that of rural areas was 114.48 millions so to say urban as 37.9% and rural as 62.1% respectively. Out of this employment in agriculture was 45% in 2012-13 but 43.7% in 2013-14. The involvement of rural population has been more in agriculture sector as compared to urban population rather 1.3% has shifted from rural to urban areas, having been involved in non agricultural activities.

Un-employment.

The number of un-employment reported for the year 2012-13 was 3.40 millions out of which 1.85 millions were from urban population. The male and female ratio being 2.22 and 1.18 millions respectively for the same year [4][5]. In a recent survey conducted by the Finance Division 5.3 million people were living below or on the edge of the poverty line, most of them were the beneficiaries of Benazir Income Support Program (BISP) since 2009-10.

The population of the country is spread over 6032 Union Councils (UCs) of 596 Tehsils and 147 districts (including 08 Tribal Agencies and 07 Frontier Regions). Out of these 122 districts were the targets of BISP which remained in vogue until 2013-14. Most of these people need to be involved in agricultural activities directly or other crops indirectly, specially towards minor crops, kitchen gardens vegetables and fruits preservation etc.

In addition to wheat, rice, sugar cane (as our staple food) crops specially for daily house hold items of flour, cane-sugar and oil seed crops. We also need some of the important kitchen items such as potatoes, vegetables and pulses (grains Masoor, Lentil, Mung, Mash) for our staple foods. Before going into the detailed

requirements, we must know the production of these items, in the first place, as tabulated in table No.03 below:

A mixed trend was seen in the growing area as well as production of main kitchen items such as potatoes, chillies and other vegetables (not recorded) but the pulses have shown as growing on increased area and production is also increasing [14] indicated in table No.3.

Market trends (retail).

While going through the rates of different items of daily use, (retail) a mixed but increasing trend have been recorded over the previous years. Averaged prices per kg. reported and presented in table No.04. This also includes average rates from Sunday, Saturday and Friday Bazars.

Human Population Groups.

The National Institute of Population Studies (NIPS) has broadly categorized three main groups on the basis of age. The first being the child age group from year 0 to 14. These were 62.83 millions in 2013 and slightly increased from 62.36 millions in the year 2011 [3]. This group is declared as un-productive but dependent on their parents for food, education clothing and health care. The second being adults from the year 015 to 59. The number of which was 110 millions in 2013, as compared to 104 millions in 2011. This is the real manpower group of a nation specially, Pakistan. These people need real attention and practically need to be involved in some business, after education, in agricultural sector, manufacturing sector or services sector for gainful employment. This group can best be utilized for country's developmental activities. The third group (years 60 and above) are again retired people, remain dependent on their young/adult group. They were less than one million in 2011 and were in the same number in 2013 [4][5].

Preparation of rural manpower for agriculture.

Since the year 1992 when the agricultural reforms were initiated in the country for the second time, as documented in the National Commission on agriculture youth was targeted as country's need, prepared to be involved in activities in the crop production, vegetables and fruits. The adult age group from the age of 15 years to 59 years, as indicated by then NIPS be given attention and best be utilized for increased agricultural production.

Farmers trainings.

Farmers training in agriculture was the prime target towards increased crop production by various training institutes of agriculture, in the country. The topics of

such short trainings were (i) Organized Agricultural Farming (ii) Improvement in Livestock Health and Production (iii) Improved seed varieties for cash crops (iv) modern techniques in agriculture (v) vegetable production (vi) preservation of fruits and seeds including (vii) soil testing (viii) preservation of food grains in storages (ix), bee keeping for honey (x) fish farming and (xi) silk worm farming etc etc. Such trainings are very useful and must be continued [18].

Basic Agricultural and Livestock Courses of AIOU for non Agricultural Students.

Since 1986 short courses on agricultural and livestock sciences have been introduced at Matric and FA level for those students who are interested in Agricultural Sciences. Allama Iqal Open University (AIOU) have introduced these courses in their Syllabi and thousands of students are being benefited. The total enrolment in course codes 326, 327, 328, 329, 342 and 49 of Agriculture and 313 in Livestock at FA whiles codes 24 and in agriculture and Livestock at Matric was 8007, 9036, 9326, 10,046 and 10,354 in the years 2010, 2011, 2012, 2013 and 2014 (in one semester, each only) as documented by Hafeez M. *et. al* (2012) and (2014) respectively. On the demand of farmers, new courses in Agriculture and Livestock Codes were also introduced in 2013 namely 256 and 257 (in agriculture) and 253 and 254 (in Livestock), at Matric level [19].

Financial assistance/agricultural credit to farmers.

The State Bank allocation of an actual disbursement to farmers community was a credit worth Rs.231.00 Bns. in the year 2012-13 as against Rs.197.4 Bns. in the year 2011-12. The distributed/disbursed amounts by ZTBL, Commercial Banks, PPCB, Domestic Private Banks and MFBs was Rs.38.00, 123.7, 5.4, 51.00 and 13.00 Bns respectively. During July 2013 to March 2014 the Banks have disbursed Rs.255.7 Bns which was 67.3% of the annual target of Rs.380 Bns. Currently 27 commercial, Islamic and Microfinance banks with around 3950 agriculture designated branches are facilitating farmer community on season to season basis (both Rabi and Kharif) for developmental loans and production of crops, Livestock, Poultry, Fisheries, Orchard, Forestry, Nurseries apiculture and Seri-culture as soft loans, for rural Community. This financial support is helping 1.5 million small and large agricultural farmers including 42,000 Livestock Farmers of the country, on yearly basis as detailed in the Pak. Economic Survey Report (2012-13), GoP, Islamabad [10][11].

Water Sector Main Programs During 2012-13.

The PSDP allocation for water sector specially irrigation of agriculture crops for increased production and protection of seepage of water in small irrigation canals and canals, as per demand of Provincial Government, was strongly supported by Federal and Provincial Ministries of Agriculture and all the Provincial Agricultural Directorates, with due recommendation by the Planning Commission, handsome allocation was made to the water sector [1][2][3][12][15] in Table No.05:

Seed Availability.

A total of 013.87, 372 metric tons of seed were made available of which 325, 253.39 metric tons of local and 46,660.48 metric tons was imported. This quantity of seed of various grains crops (wheat, paddy, maize, cotton, oil seeds) and other crops (pulses, fodder, potatoes and other vegetables) are made available to the farmers during 2013-14. It is worth mentioning that no seed for wheat, cotton and pulses were imported and all the quantity available was from the domestic progressive growers (wheat= 271, 250.00 metric tons, cotton= 17,175.25 metric tons and pulses= 689.81 metric tons respectively) as presented in the Table No.06 below:

CONCLUSIONS AND RECOMMENDATIONS:

1. We can expect the present pace of wheat growth from 2.7 to 3% from 2015 onwards, if the area under wheat is increased not less than 40-50 thousand hec/year and the production of wheat can be obtained as pre-emptive target of 27.2, 30.50, 35.8 and 40.2 million tons, keeping in view all the constants friendly including environment, financial assistance supply of fertilizer and pesticides on subsidized rates including sowing of improved seed varieties, solar panels for diesel pumps and low rates of electricity.
2. Handsome allocation be spared on yearly basis through PSDP for lining of water canals and channels in the four provinces and completion of construction of small dams in the country, as being done in the years 2011-12, 2012-13 and 2013-14.
3. Financial Assistance to small farmers, through Government and Private banks of the country, be continued on sustainable basis, each year to the tune of Rs.250-260 Bns. as credit every year, as this amount is paid back by the farmers, at the time of sale of their produce (wheat, maize, cotton, sugar cane and rice).

4. Area under cultivation of oil seed crops needs to be increased by providing special subsidiary package to farmers including collection of oil seed crops by the government agencies (PASCO or TCP), with an encouraging support price for at least 3-4 years. The import bill of edible oil was Rs.216.4 Bns in 2011-12 and Rs.153.3 Bns. in the year 2012-13. This import bill can only be reduced by increasing oil-seed crops production locally.
5. Data on production of various crops is regularly being documented, including whole sale process, as well as detailed market prices but the data regarding dumping in government as well as private super stores need, to be collected and documented.
6. Recommendations of Ministry of Food Securities and Research, vide their policy in the light of Task Force of Food Security (2008) and recent policy guidelines of 2013-15 must be implemented, not only by the federal Ministries of Planning and Development but duly supported financially by Federal as well as Provincial Financial Authorities.
7. Efforts must also be made to utilize current fallow area of 4.93 million hecs. in 2009-10, 6.71 millions in 2011-12 and 2012-13, to a tune of at least 25-30 million hecs. Instead of 22.44 million hecs. As of 2012-13. The actual reported area for cultivation was 2.04 against a total of 57.76 million hecs. in the country (although 23.14 millions hecs; is not available for cultivation – this is under constructed cities, towns villages, town ships, roads, rail roads, rivers, canals, parks play grounds, hills and other establishments).
8. Improved seed varieties of sugar cane, rice, wheat, cotton, maize oil seeds, pulses (mung, masoor, mash) vegetables and fruits, developed by various Research Institutes of the country namely NARC, ARI-Tarnab, Pir Sabak, Ratta Kolachi, RRI Mureed-Kay pattoki, CRI Multan, NIAB, NIBGE and all Agricultural University, Research Institutes, be disseminated to progressive farmers for increased production.
9. Controlled exports of Edible items /grains etc should only be allowed which are surplus and that when the fresh produce of crops grains are being purchased by TCP and PASCO, in different seasons.
10. Research Institution's funding must be increased, the vacant positions be filled (if there is a ban on recruitments, researchers must be hired on operational basis) so that research work is continued.

11. Previously a research allowance of 20% was admissible to Researchers, which if stopped/not allowed, must be restored along-with cash prizes to extra-ordinary result oriented work done by Researchers in Agriculture, Livestock, Forestry, Fisheries and allied fields.
12. Many hundred thousand hecs. of agricultural land can be restored on both sides of Rivers Indus, Chenab, Ravi and Jhelum downstream upto Punj Nad and still downstream in Sindh Province which is always subjected to soil erosion and Monsoon Ranni floods, every year. Each year 20-25 kms or more area with an expenditure of 10-15 Bns. Be made with Pakka Spurs which will not only avoid flood damages but this rich and fertile land can be utilized for increased agriculture productions.

REFERENCES

- Director Population. (2011-12) National Institute of Population Studies (NIPS), Islamabad.
- Director Population. (2012-13) National Institute of Population Studies (NIPS), Islamabad.
- Director (2011-12) Pakistan Bureau of Statistics, Government of Pakistan, Islamabad.
- Director (2012-13), Pakistan Bureau of Statistics, Government of Pakistan, Islamabad.
- Director General (2011-12), Annual Report of NARC, Islamabad.
- Director General (2012-13), Annual Report of NARC, Islamabad.
- Director Banking (2011-12) Financial Support to Agriculture Farmers, State Bank of Pakistan Report.
- Director (2012-13) Financial Support to agriculture Farm, Statement of Pakistan, Report.
- Director General (2011-12) Pakistan Oil seed Development Board (PODB), Annual Reports, Ministry of Food Securities and Research, Government of Pakistan, Islamabad.
- Director General (2012-13), Pakistan Oil Seed Development Board, Annual Report Ministry of Food Securities and Research, Government of Pakistan, Islamabad.
- Director (2011-12) Farmer's Training in different areas of Agriculture since 1986 onwards Directorate of Trainings, NARC, Islamabad.
- Chairman, DAS (2001-2002) and (2011-12), Department of Agricultural Sciences, Agricultural Text Book Series of FA and Matric, various codes, AIOU, Islamabad.
- Planning Commission (2011-12), PSDP Water Sector Projects in Provinces, Government of Pakistan, Islamabad.
- Planning Commission (2012-13) PSDP Water Sector projects with status) Planning and Development Division, Government of Pakistan.
- Print Media/News Paper (2011-12) (2012-13) and (2013-14) Market Retail Prices of various food items in the previous years.
- S.Ejaz Wasti (2011-12) Pak. Economic Survey Report. Economic Advisor's Wing, Ministry of Finance, Government of Pakistan, Islamabad.

S.Ejaz Wasti (2012-13), Pak. Economic Survey Report. Economic Advisor's Wing, Ministry of Finance, Government of Pakistan, Islamabad.
 S.Ejaz Wasti (2013-14), Pak. Economic Survey Report. Economic Advisor's Wing, Ministry of Finance, Government of Pakistan, Islamabad.

Table No.01 showing the production of various crops of the country during recent years (million tons)

Sr.#	Crops/Wheat	2011-12	2012-13	2013-14
i.	Yield (per hec/kgs)	23.5	24.2	25.28
ii.	Rice	6.160	6.900	6.798
iii.	Maize (per hec/kgs)	4.220	4.130	4.527
iv.	Sugar Cane (per hec/kgs)	58.4	63.75	56.666
v.	Oil Seed crops	3,212	3,393	3592

Source: (i) Pakistan Bureau of Statistics.
 (ii) Pak. Economic Survey Report, GoP, Islamabad.

Table No. 02 showing oilseed production of oil extracted, for the last three years, in the country (millions tons)

Crop	2011-12		2012-13		2013-14	
	Seed	Oil%	Seed	Oil%	Seed	Oil%
Cotton Seed	3212	386 12.77	3393	407 12	3592	431 12
Rape Seed/ Mustard	203	61 30	216	66 30.55	218	68 31.19
Sunflower	473	179 37.84	244	95 38.93	265	101 38.1
Canola	30	11 36.66	18	66 38.95	16	06 37.5
Total	3918	637 16.26	3871	578 14.93	4091	606 14.81

Source: Pakistan Bureau of Statistics, Pak. Economic Survey Reports, GOP, ISBD.

Table No.03 showing comparative production and area under cultivation of crops, for recent years (000 tons).

Sr.#	Crop	Area hecs.	2011-12	Area hecs	2012-13
01	Grams	1,008.0	284	985	673
02	Masoor/Lentil	2.8	11.0	19.6	9.7
03	Mung	140.8	93.0	136.1	89.3
04	Mash	24.5	10.9	23.2	10.6
05	Potatoes	185.0	3393.0	172.0	3767.2
06	Onion	129.7	1692.3	124.0	1536.5
07	Chillies	27.4	47.2	62.7	150.3
Total		1538.2		1522.6	

Source: Pakistan Bureau of Statistic.
 Pak. Economic Survey Report.

Table No.04 showing average prices of daily use food items of the country over previous years. (Rs. Per kgm)

Sr.#	Daily use food items	Years				
		2010	2011	2012	2013	2014
01	Wheat	18/-	20/-	20/-	24/-	26/-
02	Wheat flour	20/-	23/-	22/-	28/-	30/-
03	Rice (Basmati)	80/-	100/-	120/-	140/-	150/-
04	Sugar (Cane sugar)	60/-	75/-	80/-	80/-	100/-
05	Edible oil	75/-	80/-	90/-	110/-	120/-
06	Gram	80/-	90/-	120/-	140/-	180/-
07	Potatoes	40/-	48/-	50/-	55/-	60/-
08	Mung	80/-	100/-	10/-	120/-	130/-
09	Masoor/Lentil	85/-	90/-	120/-	130/-	140/-
10	Mash	90/-	110/-	120/-	140/-	180/-
11	Chilies	80/-	110/-	120/-	130/-	135/-

Source: Pakistan Bureau of Statistics, Various Market Rates News Paper (Weekly rates)

Table No.05 showing the water sector main programs during 2012-13 under PSDP, by the Federal and Provincial Government. (Million Rs.)

Sr.#	Project title/details	Allocation	Expected Utilization
01	Substantial completion of Kachhi Canal Phase-I (Balochistan) and Raineer Canal Sindh	31.204	25.50
02	Mangla Dam Raising project for additional storage of 2.9 MAF and additional power generate of 644 GWh.ts.	28.64	15.00
03	Completion of Satpara in Gilgit Baltistan for irrigation of 15536 acres of agriculture land and 17.3 MW power generation.	4.480	4.10
04	Lining of irrigation channels in Punjab Sindh and Khyber P.K.	2.978	2.900
05	Improvement of present irrigation system in Punjab, Sindh Khyber P.K and Balochistan	2.6	1.8
06	Satpara, Gomal, Darwat Nai Gaj and Naulaing Dams.	NA	NA
07	Construction of new small and delay action dams and improvement of existing irrigation system in Balochistan	6.59	6.0
08	Implementation of the RBOD-I, II, III for protection and re-claim 4.90 million areas of irrigated land.	50.256	46.820

Source: Planning Commission of Pakistan 2012-13. NA (Not available) Pak. Economic Survey Report 2012-13.

Table No.06 showing seed availability of various crops for the period (July-March, 2013-14) (Metric tons).

Sr.#	Crops	Local	Imported	Total
01	Wheat	271,250.00	0.00	271,250.00
02	Cotton	17,175.25	0.00	17,175.25
03	Paddy	33,284.94	3,840.69	37,125.63
04	Maize	2,772.89	11,617.83	14,390.72
05	Pulses	689.81	0.00	689.81
06	Oil Seed	42.00	1320.08	1362.08
07	Fodder(s)	10.00	20,921.01	20931.01
08	Vegetable	65.00	4,743.72	4808.72
09	Potatoes	63.50	4,217.15	4280.65
Total		325,353.39	46,660.48	372,013.87

Source: Federal Seed Certification and Registered Department, Islamabad. Pak. Economic Survey Report, Government Islamabad.

THE STATUS OF OIL-SEEDS PRODUCED AND FUTURE REQUIREMENTS OF EXTRACTED OIL, SEED CAKES AND EDIBLE OIL FOR THE RECENT YEARS IN THE COUNTRY AND FUTURE TARGETS

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ABSTRACT

This research paper provides the comparative status of cottonseed, rapeseed/mustard seed, sunflower seed and canola seed produced, oil extracted and oilseed cakes produced during the reported period of three years (2011-12, 2012-13 and 2013-14). The total oilseed produced was 3.96 million tons, over the reported period (comprising cottonseed as 4.00, rapeseed/mustard seed as 0.212, sunflower seed as 0.33 and canola as 0.02 million tons respectively). The oil extracted on an average over the reported period was 0.60 million tons (comprising oil extracted from cotton seed as 0.408 from rapeseed/mustard as 0.065, from sun-flower-seed as 0.125 and from canola seed as 0.004 million tons) respectively. The % oil extracted from each quantity and types of seeds was, average at 12.003%, 30.60%, 38.60% and 34.72% respectively. The oil seed cakes produced from these oil seeds was recorded as 2.991 (87.99%), 0.147 (69.40%), 0.20 (61.71%) and 0.017 (65.28%) million tons out of cotton seeds, rapeseed/mustard seed, sun-flower seed and canola seed respectively. The total edible oil produced in the country was 0.602 million tons against the imported edible oil it is recommended to increase the production of oil seed crops specially the sunflower, rapeseed/mustard seed and canola to meet the increasing demands in future, in the light of population boom to the year 2030.

Key words: Oil seeds Edible oil Extracted oil seed cakes, Edible oil requirements, Pakistan.

INTRODUCTION:

A formal discussion was carried out concerning the status of oil seed crops in the Allama Iqbal Open University (AIU) Paper Evaluation Group of Agriculture Sciences, in Spring 2014 which comprised the authors, the Members Editorial Board on Agriculture and the Chief Editor, Pakistan Journal of Livestock Sciences (PJLSc). This was given the opportunity to a proper meeting in which all related aspects were discussed and the authors were required to come up with a paper/article supported with proper data and an investigative approach be given to this topic, with the following objectives:

- (i) To collect authentic data on oil seeds produced, in the recent three years (2011-12, 2012-13 and 2013-14), specially cotton seed, rapeseed/mustard seed, sunflower and canola seed.
- (ii) To work out the actual quantity of oil extracted from these oil-seeds, oil seed cake produced and future prospects in the country, as requirements.
- (iii) To elaborate the edible oil imported, the import bill of the nation and our approach towards increased oil seed production, with oil extracted in future.

- (iv) To work-out the futuristic strategy in the light of population boom and domestic requirements of edible oil to the year 2030.
- (v) To make recommendations to reduce the import bill on edible oil of the country.

The population boom, as forecasted by the National Institute of Population Studies (NIPS) Islamabad, indicates that the population figures will reach to the number of 192.72, 210.12, 227.26 and 242.06 millions in the years 2015, 2020, 2025 and 2030 respectively with an yearly increase/growth of 2.7% in the year 2015 onwards. The Agriculture growth with a percentage of 2.6% – 2.7% yearly for grain crops, edible items like cane sugar, rice and maize with variable percentage has been documented by Shafique Qadir Memon *et.al* (2015) but we need to explore ways and means to increase edible oil for our people. The major bill of which amounting to Rs.216 billions can be utilized in any other head from within the Agriculture Sector, may be in Research and Development etc.

The total edible oil produced (from cotton seed, rapeseed/mustard seed, sun-flower seed and canola seed) was 0.637, 0.578 and 0.606 million tons in the reported years while the imported quantity of edible oil was 2.148 million tons in 2011-12. The import bill of imported quantity of edible oil was Rs.216.4 billions in the same year-2011-12.

During 2012-13 (July-March) 1.738 million tons of edible oil was imported with a total cost of Rs.153.3 billions. The production of total quantity of edible oil is given in table No.05. The gap between local production and imported quantity is three times. This situation warrants the increased production of those oil crops which provide greater %age of oil (be extracted), such as sun-flower (38%) and mustard seed/rapeseed (30-31%), as compared to cotton seed. The authors were given this task as an assignment, for a period of not more than a month, without any remuneration. A comprehensive and scientific approach was given to this topic and this paper is the collective effort out come and is being published.

MATERIAL AND METHODS:

The following documents/reports were excessively consulted:-

- i. Annual Reports of National Oil Seed Development Board, Ministry of Food Securities and Research, Government of Pakistan, for the years 2011-12,

2012-13 and 2013-14.

- ii. Pakistan Bureau of Statistic's data of Agriculture, for these years.
- iii. National Institute of Population Studies (NIPS) reports of these years and forecasting to the year 2030.
- iv. Pak. Economics Survey Reports, for these years.
- v. PARC annual reports of these years.
- vi. Recommendation of various symposia/seminars/conferences and workshops.
- vii. Public Sector Development Projects (PSDP) relevant approved projects, in these years.

RESULTS:

The production of cotton seed produced was 3.22, 3.39 and 3.59 million tons during 2011-12, 2012-13 and 2013-14 respectively. Rape seed/mustard seed produced was 0.203, 0.216 and 0.218 million tons for the reported three years while sunflower seed produced was 0.473, 0.244 and 0.265 million tons for reported years. The canola seed produced was 0.03, 0.018 and 0.016 million tons for these years respectively, as appears in table No.01.

The oil extracted from cotton seed in the country, for the three reported years, was 0.386 (12.017%), 0.407 (11.995%) and 0.431 (11.998%) million tons respectively. The oil extracted from rape seed/mustard in the reported years was 0.061 (30.05%), 0.066 (30.55%) while the data for sun flower for these years was 0.179(37.84%), 0.095 (38.93%) and 0.101 (38.11%) million tons respectively. However, the oil extracted from canola seed was 0.001 (33.33%), 0.006 (33.33%) and 0.006 (37.5%) million tons respectively as shown in table No.02.

The oil seed cake produced from cotton seed in the reported period was 2.826(87.983%), 2.986(88%) and 3.161 (88.002%) million tons respectively. The mustard/rapeseed cake produced was 0.142 (69.95%), 0.15 (69.45%) and 0.15 (68.81%) million tons, respectively, in the reported period of 2011-12, 2012-13 and 2013-14. the sunflower seed cake produced in the country during the reported period was 0.294 (62.16%)0.149 (61.07%) and 0.164 (61.67%) million tons respectively. The canol seed cake produced in the reported year however was 0.029 (66.67%), 0.012 (66.67%) and 0.01 (62.50%) million tons.

DISCUSSION:

The nation being a consumer of wheat for our staple food, cane sugar for our drinks, cotton for our textile mills and our clothing while edible oil for our kitchen for cooking, the population boom is alarming the planners, administrators, agriculture scientists and Financers to supports farmers with increasing financial support, disseminating the research based results in the form of improved seed varieties, new technologies and timely irrigation water. More so we need to utilize maximum of our agricultural land for cultivation of grain crops, cash crops and the oil-seed crops. We have observed that the edible oil extracted from four various kinds of oil seeds namely cotton seed, rapeseed/mustered seed, sun-flower seed and canola seed hardly comes to 0.602 million tons which comprises with a greater percentage from cotton seed (0.408 millions tons) out of 3.4 millions tons of seed (on an av. from three reported years).

The cotton seed is a by-product of cotton crop produced in the country. The oil extracted from cotton seed is 12% on an average. The oil extracted from sunflower seed, on an average is 0.125 million tons out of an average total quantity of 0.327 millions tons (of the reported period) which stands to be 38.29% and is the second largest quantity produced in the country. The third category of oil extracted is from the rape seed produced as 0.06 millions tons out of 0.212 millions tons of seed and stands to be 30.60%. The fourth category of oil extracted is from canola oil seed which was 0.004 million tons out of a total quantity of canola seed of 0.021 millions tons (on an average), in the reported period, with the average percentage of oil as 34.72%. This gives us a clear indication that the crops of sun flower, rapeseed/mustered and canola can be an increasing source of edible oil for our people if the area under cultivation is increased not more than 10,000 hectare per season for each crop, every year. This will not only become an indigenous source of edible oil but will also help in curtailing our import bill of edible oil to a greater percentage, year after year, until we become self sufficient. Much has already been written, based on canola seed, mustard/rapeseed, sunflower seed and cotton seed (various disease resistant varieties, per hectare yield, increased trend of domestic use of these oil-seed and oil-extracted specially from sun flower and canola, their support prices and good growth on a limited land etc etc. since 20 years; but still we need to convince farmers to grow more for our present domestic and future requirements.

Yet another by-products of oil seeds, after the extraction of oil, is the oil seed cake. This becomes a rich source of proteins as well as oil-based feed used as concentrate for dairy animals (both cows and buffaloes). Cotton seed-cake and rape-seed/mustard seed cakes have since been acclimatized but sunflower seed cake and canola seed cakes are also being provided to dairy animals and small ruminants (sheep and goats), including poultry feed, for growth as well as increased milk production, in the country. On an average, the cotton seed cake produced was 88%, the rape-seed/mustard seed cake produced was 69.40%, the sunflower seed cake produced was 61.71% while the canola seed cake produced was 65.32% in the reported period.

The total production of oil-seed cake in the country on an average from four oil seed crops (reported) was 3.355 millions tons (comprising 2.99, 0.147, 0.20 and 0.017 million tons from cotton seed, rape seed/mustered seeds and canola seeds, respectively). The oil seed cake obtained from sunflower seed and canola seed was lesser in quantity than the oil seed cake obtained from cotton seed and rapeseed/mustered seed as being cultivated on less area of land. The market rate for cotton seed cake and mustered/rape seeds cake for a bag of 27 kgs was Rs.810/- in 2013 which has recently been increased to Rs.1000/- with a retail of Rs.1300/- in the year 2014 (October-December, 2014). The sunflower seed cake and canola rates are still higher. These oilseed cakes are better used in concentrate feed for dairy animals, small ruminants and poultry.

CONCLUSIONS:

- i. This assignment, based on comparative data of three years (2011-12, 2012-13 and 2013-14, concludes that cotton seed was produced, on an average, as 3.399 million tons, a by-product of cotton crop, in the country.
- ii. The production of rape-seed/mustard seed was produced, on an average, in the reported period as 0.212 million tons in the country.
- iii. The total quantity of sunflower seed produced, on an average was 0.327 million tons in the country, in the reported period of three years.
- iv. The total quantity of canola seed produced, on an average in the country was 0.021 million tons.

- v. The oil produced/extracted collectively from cotton seed, rape-seed/mustard seed, sun flower and canola seed was 0.602 million tons, during the reported period.
- vi. The percentage of oil extracted/produced from cotton seed, rape seed/mustered seed, sun flower and canola seed was, on an average 12.003%, 3.60%, 38.29% and 3472% respectively during the reported period.
- vii. The total edible oil produced (0.602 million tons) was hardly one third (1/3) of the total quantity of edible oil imported in the country (1.738 million tons) say in 2012.
- viii. The edible oil obtained from three oil seed crops can be increased, specially the sun flower, rape-seed/mustard and canola, if grown on at least 10,000 hectare additionally, not only to meet our domestic requirement of edible oil but also to make available increased quantity of oil seed cake for dairy animals, as source of concentrate feed, in the light of population boom upto the year 2030 and onwards.
- ix. As the oil extracted from these three oil seeds is greater in quantity (30.60%, 338.29% and 34.72%) as compared to cotton seed (12%), these must be cultivated on additional land from the year 2015 onwards on regular basis.
- x. The oil seed cakes produced/obtained from all the four oil seeds was 3.355 million tons as a by-product of oil seed crops, after extraction of edible oil which is never wasted and consumed as rich source of feed for dairy and other animals including poultry, within the country.

NB: The data on Sayabeen, Torea, Castor oil, Almond oil, coconut oil not documented hence was not included in this write-up

RECOMMENDATION:

1. Oil seed crops with greater %age of oil must be grown with preference on increased area of agricultural land.
2. Proven seed of oil seed crops, specially the disease resistant varieties be used.
3. From where we will get the additional 10, 000 hectares of land?? This will be created by stopping soil erosion of river sides of kacha/kachi river banks by making spurs on both sides of rivers.
4. This can be done in lower Punjab and Sindh Province.

REFERENCES:

- Director (2012-13) (2013-14) Population Census Organization/National Institute of Population Studies, Government of Pakistan, Islamabad.
- Director (2012-13) (2013-14) National Institute of Population Studies (NIPS), Islamabad, Planning and Development Division, GOP, Islamabad.
- Director General (2011-12) (2012-13) (2013-14), Research Data on various Crops: National Agricultural Research Centre (NARC), Annual Reports, Islamabad.
- Director General (2011-12) (2012-13) (2013-14). Oilseed Development Board, Ministry of Food Securities and Research, Government of Pakistan, Islamabad.
- Fahad Karim (2013-14) status of oil seed crops: with special reference to olive oil production project NARC, personal communication.
- S.Ejaz Wasti (2011-12). Agriculture: Pak. Economic Survey Report. Economic Advisor's Wing, Ministry of Finance, GoP, Islamabad.
- S.Ejaz Wasti (2012-13). Agriculture: Pak. Economic Survey Report. Economic Advisor's Wing, Ministry of Finance, GoP, Islamabad.
- S.Ejaz Wasti (2013-14). Agriculture: Pak. Economic Survey Report. Economic Advisor's Wing, Ministry of Finance, GoP, Islamabad.

Table No.01 showing the quantity of Oilseed produced along-with oil extracted for the years 2011-12, 2012-13 and 2013-14.

Sr.#	Seeds	2011-12	2012-13	2013-14
01	Cotton Seed	3.212/0.386	3.393/0.407	3.59/0.431
02	Rape Seed/ Mustard	0.203/0.061	0.216/0.66	0.218/0.68
03	Sunflower	0.73/0.179	0.244/0.095	0.265/0.101
04	Canola	0.03/0.001	0.018/0.006	0.016/0.006

Source: Pakistan Oil Seed Development Board, M/o Food Securities and Research, GoP, Islamabad and Pak. Economic Survey Reports of three years.

Table No.02 showing total quantity of cotton seed produced oil extracted and cotton seed cake produced during recent years in Pakistan.

Years	Cotton Seed	Oil Extracted	%age	Cotton Seed cake	%age
2011-12	3.212	0.386	12.017	2.826	87.983
2012-13	3.393	0.407	11.995	2.986	88.00
2013-14	3.592	0.431	11.998	3.161	88.002
Average	3.399	0.408	12.003	2.991	7.995

Source: Pakistan Oil Seed Development Board, M/o Food Securities and Research, GoP, Islamabad and Pak. Economic Survey Reports of three years.

Table No.03 showing total quantity of rapeseed/mustard seed produced, oil extracted and rape seed/mustard Cake produced during recent years.

Years	Rapeseed Mustard	Oil Extracted	%age	Rapeseed/ Mustard Cake	%age
2011-12	0.203	0.061	30.05	0.142	69.95
2012-13	0.231	0.066	30.55	0.15	69.45
2013-14	0.218	0.068	31.19	0.15	68.81
Average	0.212	0.065	30.60	0.147	69.40

Source: Pakistan Oil Seed Development Board, M/o Food Securities and Research, GoP, Islamabad and Pak. Economic Survey Reports of three years.

Table No.04 showing total quantity of sunflower seed oil extracted and sunflower cake produced during previous years.

Years	Rapeseed Mustard	Oil extracted	%age	Rapeseed/ mustard Cake	%age
2011-12	0.473	0.179	37.84	0.294	62.16
2012-13	0.244	0.095	38.93	0.149	61.07
2013-14	0.265	0.101	38.11	0.164	61.89
Average	0.327	0.125	38.29	0.20	61.71

Source: Pakistan Oil Seed Development Board, M/o Food Securities and Research, GoP, Islamabad and Pakistan Economic Survey Reports of three years.

Table No.05 showing the Canola Seed produced and Canola oil extracted for three years (2011-12, 2013-13 and 2013-14).

Years	Canola seed	Oil Extracted	%age	Canola Cake	%age
2011-12	0.030	0.001	33.33	0.029	66.67
2012-13	0.018	0.006	33.83	0.012	66.67
2013-14	0.016	0.006	3.75	0.01	62.50
Average	0.021	0.004	34.72	0.017	65.28

Source: Pakistan Oil Seed Development Board, M/o Food Securities and Research, GoP, Islamabad and (ii) Pak. Economic Survey Reports of three years.

AGRICULTURAL FOOD REQUIREMENTS AND THE ENVIRONMENTAL CHANGE, AS VISIONED TO THE YEAR 2030 AND BEYOND

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ABSTRACT

This paper has analysed and connected the existing research studies on agricultural outputs in relation to environment, global warming including adaptation to changes in climate in developed as well as developing countries. Especially the environmental changes either by i-migration to new areas, ii- changing the crops pattern, we cultivate or iii- building different types of shelter. However, the current rate of global climate change is unusually high as forecasted by 3-4 degree by the year 2050 and 2100. This research cum review paper includes negative effects of climate change on population and economic sectors in developed and developing countries which can have repercussions around the world. This approach suggests a certain set of actions to be taken by policy-makers in order to promote positive and discourage negative actions, respectively in order to minimize the already inevitable impact of climate change. As our country demands, related to agricultural food production, in the light of population boom, to the year 2030 and beyond. This paper discusses two aspects of these impacts; firstly, the extent to which agricultural output and prices are likely to be affected by climate change (with illustrating its impacts diagrammatically). Secondly, it analyses which countries are likely to gain and which countries are likely to lose in the event of no measures taken to mitigate the effects of global climate change. Finally, the paper concludes with recommendations.

Keywords: Environment, global warming, Green house effect, future food requirements Pakistan

INTRODUCTION:

Living organisms, particularly human beings, influence the environment in many ways; however, it is not until the twentieth century, that the impact of human activities grew out of proportions (IPCC, 2007). One of these impacts is the variation on the climate system which appeared as one of the most important environmental issues capturing the interest of the environmental, social and economic sciences. Dawson & Spannagle (2009) mentioned that anthropogenic actions such as fossil fuels dependency, the increment on the emissions of the greenhouse gases, and deforestation are disturbing the normal dynamics of the climate structure causing an increment in the average temperature on Earth. As a result, this warming process is transforming the planet in many ways, creating concerns about the welfare of human beings in the future.

Given that, food production is an activity extremely dependent on weather, and climate is one of the sectors that is expected to change rapidly. We can only assume that there will be a proportional impact also on food production processes (Gregory *et al.*, 2005). There are concerns regarding the potential effects of climate change on agricultural productivity and so more on food security as reported by

Adams et al., (1998). As a result of this interest, there has been an explosion of studies and researches trying to predict what would happen and how can negative impacts be avoided. Opinions on anthropogenic climate change vary greatly across society, Thus agricultural producers face a complex challenge of adapting to an increasingly difficult climate.

Regardless of farmers' beliefs on whether, the climate is actually changing and what is causing the changes, there are impacts that will need to be managed. Therefore, it is possible to avoid, reduce or minimize the conflict between increasing human food demands and ecological limits in the face of climate change, pro-active planning for a range of long-term impacts through adaptation and mitigation will be critical to the success of farming operations, in the future.

LITERATURE REVIEW:

The natural regulating temperature process of the planet and the circulation of the atmosphere and oceans produce the weather and the climate on the Earth. Mathez (2009) clarifies that even though climate and weather are two terms that have almost the same definition and are strongly related, they do not refer to the same thing. On the other hand, Wang and Schimel (2003) identify that generally; climate could be explained as the average of the weather during long periods of time and over a large area. In addition Inter Governmental Panel on Climate Change IPCC (2007) states that climate, as a technical term, should be understood as a statistical description including the mean and the variability of some phenomena such as precipitation, temperature and winds during an extensive period of time.

The Green House Effect (GHE).

The Australian Bureau of Meteorology (ABM-2010) highlights the GHE as a natural atmospheric phenomenon that maintains or regulates the temperature inside the planet. As a simple explanation, this is a process where the sun emits shortwave radiation absorbed by the atmosphere and by the Earth's surface thereby warming them. Then, the Earth's surface produces long-wave radiation emitted back into space but a percentage of it is absorbed by greenhouse gases {such as methane (CH₄), carbon dioxide (CO₂), water vapour (H₂O), nitrous oxide (N₂O), and ozone (O₃)} and re-emitted in all directions keeping the planet warm. Smernik (2011) confirms that the real environmental issue with GHE is due to the fact that since 1750 atmospheric CO₂ has increased in almost 35% making the atmosphere thicker

allowing less radiation to escape into space, consequently warming the planet more and more.

Impact of climate change in agricultural outputs and prices.

Roson and Van Der Mensbrugge (2010) recognize that the relation between temperature increment and agricultural yields is not linear reason that explains the initial positive agricultural benefits where the temperature has only increased slightly. In this sense temperate latitudes will become more viable and productive, and the negative impact on tropical latitudes will be negligible as reported by (Valenzuela and Anderson, 2011). However, any further increase of temperature will cause a significant negative impact on tropical areas and will diminish global agricultural production.

The following two figures (1 and 2) demonstrate the economic effects of climate change in tropical and temperate countries. According to the economic theory of supply and demand, as agricultural outputs change, the price of agricultural products will also fluctuate up and down. Figure 1 shows how in tropical countries, the supply will decrease while prices will increase, bringing stress for the tropical country's food security. In contrast, as we mentioned before, most agricultural productivity in middle and high latitude temperate countries such as Northern U.S. and Canada would increase, therefore, the surplus production, will push prices down as shown in Figure 2.

The rising temperature in tropical areas which covers a wide number of developing countries might deteriorate the crop's yield and also the quality of farm output. Moreover, it reduces the labour productivity and also provides a better environment for spreading diseases. As a result the land productivity is projected to fall in the tropics.

The Table 1 shows the projected effect on land productivity of climate change by 2030 as reported by (Hertel *et al.*, 2010).

Table 2 summarizes the effects of the climate change on the production, consumption and trade, assuming three scenarios for productivity (i) low, (ii) medium and (iii) high. According to it, the projected volumes of agricultural outputs, would shrink by less than 2% in medium case for developing countries, but in the low productivity case the effect is larger and ranges between -5.6% for India and -6.5% for sub-Saharan Africa. On the other hand, the farmer price in medium scenario will

increase in most of the countries except a small number of them such as Japan and Russia. While taking into account the low productivity scenario, all the countries face increases in prices. However considering the high productivity scenario, which is rather optimistic, all of the mentioned countries face decreased prices as put forward by Valenzuela and Anderson (2011).

The other issue that should be discussed is productivity shocks in agriculture resulting from climate change. The percentage change in yield for four (4) staple products (maize, wheat, rice and soybean between 1990 and 2030 is shown in Figure 3 as put forward by Long *et.al* (2006). Maize and other coarse grains show the biggest potential of negative outcome. This confirms the studies done about a low responsiveness of C4 crops to increased CO₂ concentration (Long *et al.*, 2006 and Ainsworth *et al.*, 2008) and high sensitivity to extreme heat in both temperate and tropical maize (Schlenker and Roberts, 2008), and is consistent with estimates.

Maize yield losses due to warming since 1980. Estimates of the impact of climate change on wheat and rice yields, typically span zero across low and high-productivity cases, and include the possibility of large yield gains in currently cold-limited wheat systems in regions such as the EU and Canada. The estimated changes in global commodity prices, as a result of these shocks, are small for the central case for most commodities, although coarse grain prices are projected to increase by 15%. The average world price increase for all cereals (3.6%) can be observed in Figure 4, which is consistent with previous global projections of near-zero cereal price changes for approximately 1°C of warming. However, the low productivity and high productivity scenarios indicate the potential for large price impacts, with an average rise of 23% for cereals and 63% for coarse grains as reported by Hertel *et al* (2010).

To add, most of the developing countries will see a decrease in food self-sufficiency estimated to decrease from 98% in 2004 to 93% in 2030 (Valenzuela and Anderson, 2011). This trend can only be expected to intensify when temperatures increase even more than the projected 1.48°C for 2030, which will also affect developing countries in productivity (Figure 5).

Roson and van der Mensbrugghe (2010) state that the total temperature increment for the year 2100 is of 4.87° C (Figure 6). Resulting in negative impacts on agricultural yields for every latitude with particularly negative effects in the Middle East and North Africa, where the combination of effects such as water scarcity,

human health and job productivity result on dire consequences for the estimated real GDP (Figure 6).

Which countries are likely to gain and which countries are likely to lose. In the business-as-usual scenario where measures are not taken to mitigate the effects of global climate change and for reasons of equity, it is important to consider the distribution of those impacts across the planet and also the capacity of each single country to achieve at least adaptation as put forward by Cline (2007). The best way to start is based in the division of countries between two groups (i) developed and (ii) developing countries. It appears that the first group of countries is going to gain with climate change while the second group is going to lose, due to their lack of infrastructure and technologies and the accelerated demographic growth as reported by Nelson *et al.* (2010). Based on the scientific estimation it is understood that by 2050 the human population will reach 09 billion, and the demand for food, another key issue, when analysing effects of climate change (Nelson *et al.*, 2010). It is predicted that a big portion of the population growth will take place in developing countries, and predicted a decrease in agriculture products.

Figure 8 demonstrates that in developing countries the demand for food will be greater than the supply, increasing food prices and making people to spend relatively more of their income on food. On the contrary in figure-a it is projected, most of the developed countries will have negative population growth or at least a neutral one, it is expected an increase in supply with no big changes in demand and concludes that most developed countries will benefit from the global climate change and most developing countries will suffer from the global climate change.

Figure 10 provides a useful summary of the combined effects of economic development and climate change on food security under two scenarios: (i) an optimistic scenario in which there is high economic growth and low population growth and (ii) pessimistic scenario in which there is low economic growth and high population growth as worked out by Nelson *et al.* (2010). It is also possible to asseverate that food security in developing countries is more vulnerable, for climate change, under both scenarios, having less kilocalorie intake per person per day.

There are many facts that explain that possible outcome: Firstly, low latitude countries have higher temperature, with sudden decrease or increase in annual rainfall (increasing the frequency of extreme events and water stress). Secondly,

Developing countries have greater dependence on agriculture and natural resources. For example, heavily populated countries of Asia, the Pacific and sub-Saharan Africa have ranges from 40 to 70% of their working population making their living from agriculture as mentioned in ILO (2007). Thirdly, these developing countries' (low-income population) face problems related with poverty, malnutrition and inadequate complementary services, like health and education. Thus, these low latitude developing countries have lower adaptive capacity to face the negative effects of climate change. This is presented in Figure-10.

In addition, figure 11 shows percentage deviation of real GDP, at 10-years intervals, for different regions/countries, confirming that the effects of climate change in economic growth may be significant and the most negative consequences will be felt in developing countries.

RESULTS:

- i. The influence of climate change cannot be over emphasized, is essential to understand and anticipate its affects in every aspect of our future. However, it is easy to dismiss the consequences as mild, based on some of the global projections available.
- ii. In the specific case of agriculture, the trends are not linear and the climate changes affect in very different ways, different parts of the world depending on their geographical characteristics, location, population and level of development. This is why the overall global mildly negative results tend to hide deeper and far more concerning predictions.
- iii. Climate change is a very slow and gradual set of effects taking place over very long periods of time. Agricultural outcomes will shift and change with climate change, benefitting particular latitudes and damaging others.
- iv. Its effects will be amplified by other factors in developed countries, it will result in higher self-sufficiency, their low or negative demographic growth will keep prices from getting too high, and their inherent GDP growth will account for the most of the remaining effects of higher prices.
- v. Developing countries will also experience amplification of the effects but on the opposite direction; their rapidly growing populations and decreased agricultural production due to warmer temperatures, health concerns and lower labour productivity will cause prices to reach new heights, meaning

lower self-sufficiency, causing a further impairment of an already limping GDP.

- vi. The complexity of the system means that many unknowns remain; however a consistency, in the various studies taken into account, point to a challenging agricultural environment never seen before.

RECOMMENDATIONS:

To avoid climate change and its impacts in agriculture, two kinds of action can be taken, actions looking for adaptation and actions for mitigation:-

- ***Actions for adaptation***

Technical improvements and management adjustments at the farm level are the best way to avoid impacts of climate change in crops production and is well known that these adjustments, alone or in combination, can minimize climate impacts on agriculture. On an average, adaptation practices can provide around 10 – 15 % yield benefit compared to no-adaptation. Shifted dates of planting allow farmers to take advantage of the longer growing season, which is permitted, by higher winter temperatures, avoiding heat and drought stress, in late summer.

- New crop varieties can provide more appropriate thermal requirements and increased resistance to heat shock and drought.
- Improvement of water management can balance rising water demand, caused by higher temperatures. A shift from rain-fed to irrigated agriculture may be an option, although water availability, costs and competition with other sectors needs to be considered. Adjustments like timing of irrigation and improvement of water use efficiency can ensure water supply for crops even under warmer and dryer climates.

- ***Action for Mitigation***

- (i). The adaptive capacity at the farm level is likely to be sufficient in many developing countries, however for developed ones, mitigation should be the target, specially because these countries are responsible for the emission of almost 47% of GHG that are warming the planet and also because they have the technology and the economic flexibility to do it.
- (ii). In general, for mitigation it is imperative that change in government policies, through the implementation of a system of incentives, for those who care and punishments (such as taxes), for those who don't.

- (iii). More emphasis on community education will develop awareness on climate change mitigation and bring about behavioural change regarding consumption/production patterns.
- (iv). Investments in research and development will generate knowledge for effective decision making.

REFERENCES

- Adams, R., Rosenzweig, C., Peart, R., Ritchie, J., McCarl, R., Glycer, J., Curry, R., Jones, J., Boote, K. and Allen, L., Jr. (1998). Global Climate Change and U.S. Agriculture. *Nature*, 345, 219-23.
- Australian Bureau of Meteorology, 2010. The greenhouse effect and Climate Change official report of Australia.
- Cline, W. 2007. Global Warming and Agriculture: Impacts Estimates by Country.
- Dawson, B & Spannagle, M (2009), *The Complete Guide to Climate Change*, Routledge, United States of America and Canada.
- Gregory, P. J., Ingram, J. S. I. and Brklacich, M. (2005). Climate change and food security. *Phil. Trans. R. Soc. B*. 360, 2139–2148.
- Hertel, T. and Rosch, S. (2010). Climate Change, Agriculture, and Poverty. *Applied Economic Perspectives and Policy*. Vol.32 ,No.3, p.p.355-385.
- Hertel, T.W., Burkeand, M.B. and Lobel, D.B. (2010). "The poverty implications of Climate Induced Crop Yield Changes by 2030". *Global Environmental Change* 20:577-85
- ILO. Action Plan (2007-2008). International labour Organization Partnerships and Development Cooperation Department,
- International Institute for Sustainable Development and Environmental Adaptation Research Group, Institute for Environmental Studies, University of Toronto 1997. Agriculture and Climate Change. A Prairie Perspective.
- IPCC 2007, *Climate Change (2007): The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC)*, Cambridge University Press, Cambridge, United Kingdom and New York, United States of America.
- Mathez, E (2009), *Climate Change: The science of global warming and our energy future*, Columbia University Press, New York, United States of America.
- Memon Shafique Qadir, Khan Sartaj, Farhatullah and Nasira Parveen (2015)" Increased Agricultural Production by the year 2030": A futuristic approach for Pakistan, *Pak J.LSc.* Vol-VII, No.06, 482-493.
- National Bureau of Statistics of China (2009). China Statistical Year Book 38–89. Effects of Climate Change on Agriculture in Different Regions of China. Vol 03(04): 229-233
- Roson, R and van der Mensbrugge, D. (2010). Climate Change and Economic Growth: Impacts and Interactions. The World Bank, Washington.
- Tao, F. L., Yokozawa, M., Liu, J. Y. and Zhang, Z. Climate-crop yield relationships at provincial scales in China and the impacts of recent climate trends. *Clim. Res.* 38, 83–94.
- Tubiello, F.N., and C. Rosenzweig. (2008). Developing Climate Change Impact Metrics for Agriculture. *The Integrated Assessment Journal* 8, no. 1: 165–184.
- Valenzuela, E and Anderson, E. (2011). Climate Change and Food Security to 2030: A Global Economy-wide Perspective, University of Adelaide, Australia.

Table No. 01 Showing the Projected effect on land productivity of climate change

Country	Wheat	Coarse grains	Rice	Oil-seeds
Australia	7	-5	-3	2
United States	2	3	-3	2
W. Europe	7	-5	7	7
Japan	4	0	9	9
China	2	-10	0	0
Other DCs(Including Pak)	-3	-10	-3	-3

Courtesy - (Hertel et al., 2010)

Table No.02 showing the farmer prices and other values at low, medium and high sceneries in various regions of the world.

Regions	Farmer price			Agricultural production volume			Agricultural consumption volume			Agricultural value added			Agricultural value of exports			Agricultural value of imports		
	Low	Med	High	Low	Med	High	Low	Med	High	Low	Med	High	Low	Med	High	Low	Med	High
USA	5.7	0.9	-2.0	-2.6	-0.3	0.9	-2.2	-0.4	0.8	-8.5	-1.6	3.9	0.8	0.8	-0.9	14.2	0.9	-6.8
Canada	4.2	0.3	-2.2	0.3	1.3	1.5	-1.5	0.2	1.4	-9.4	-2.3	3.8	8.6	3.9	-0.3	7.1	0.5	-3.6
EU27 and EFTA	1.7	-0.2	-1.3	3.9	1.2	-1.2	0.4	0.3	0.0	-9.2	-0.8	5.3	18.3	3.9	-6.8	0.9	-0.8	-1.0
Russia	4.2	-0.2	-3.1	-1.5	0.8	2.4	-0.9	0.2	1.0	-4.6	-0.7	2.1	11.1	10.2	10.0	5.9	-1.5	-6.4
Rest of Europe/C. Asia	4.2	0.5	-3.5	0.8	1.6	1.9	-1.2	0.3	1.2	-7.6	-0.9	4.2	28.7	13.0	0.1	7.3	-1.8	-7.3
Australia	4.1	0.6	-2.2	2.3	0.9	0.9	-2.1	0.2	1.6	-9.2	-2.1	3.1	10.5	2.8	-0.8	7.2	1.2	-5.8
New Zealand	1.9	0.2	-0.9	5.4	1.5	-1.7	1.0	0.6	-0.2	-9.0	-2.0	3.8	11.2	2.7	-3.8	3.3	-0.3	-1.9
Japan	1.1	-0.4	-1.3	2.7	0.7	-0.8	1.4	0.4	-0.4	-6.6	-0.1	4.5	87.0	14.9	-24.7	0.4	-0.5	0.0
Korea	1.4	-3.4	-7.0	2.9	4.3	5.5	1.8	1.5	1.5	-6.7	0.0	5.6	38.9	44.1	33.8	2.0	-5.4	-10.8
HongKong/Sing/Taiwan	2.2	0.3	-2.5	3.6	1.2	1.7	2.1	0.5	-0.2	-9.0	-2.1	3.8	31.8	11.5	-1.3	3.8	0.9	-3.4
China	12.7	4.3	-1.5	-4.1	-1.7	0.1	-1.7	-0.8	0.0	-12.1	-4.5	1.8	-24.0	-20.2	-18.8	18.0	6.1	-2.4
Indonesia	4.7	1.4	-9.7	0.1	-0.6	6.4	0.4	-0.2	2.1	-5.8	-0.8	5.7	41.9	8.6	66.4	3.0	1.8	-18.5
Malaysia	5.8	1.1	-2.7	-3.5	-1.1	1.3	3.5	0.5	-1.6	-4.0	-0.3	2.8	1.9	-0.7	-3.4	9.1	1.8	-4.0
Thailand	9.0	2.3	-3.2	-4.0	-1.4	0.9	-1.6	-0.7	0.4	-8.3	-2.0	4.1	-1.4	-1.3	-1.2	15.4	3.8	-4.9
Rest of East Asia	7.0	1.7	-2.6	-3.7	-1.3	0.8	-1.4	-0.5	0.4	-5.1	-0.8	3.0	3.4	-2.6	-6.8	13.2	3.4	-4.3
India	12.9	3.3	-4.2	-5.6	-1.7	1.6	-3.0	-0.9	1.1	-8.4	-2.1	3.7	-6.0	-5.9	-4.1	40.8	12.6	-9.5
Rest of South Asia	6.0	1.3	-2.3	-3.4	-1.1	0.8	-1.1	-0.3	0.3	-4.2	-0.5	2.5	4.2	-3.3	-8.8	12.6	4.1	-3.2
Argentina	6.1	1.2	-3.2	-2.1	-1.7	1.8	-8.1	-1.1	-4.9	-8.4	-0.1	4.9	11.0	-2.8	-5.0	6.7	1.8	-2.5
Brazil	5.2	0.6	-2.5	-1.4	-0.6	-0.1	-3.1	-0.4	1.4	-7.3	-0.3	5.1	4.1	-1.2	-4.7	6.7	0.7	-3.3
Rest of Latin America	6.5	1.1	-1.7	-2.7	-0.9	-0.2	-1.2	-0.3	0.1	-7.2	-0.8	3.4	0.7	-4.3	-7.9	10.9	2.2	-1.8
Middle East/Nth Africa	4.1	0.0	-2.9	-0.2	0.6	1.2	-0.1	0.2	0.4	-6.1	-0.6	3.4	18.9	5.4	-3.3	4.5	-0.2	-3.5
South Africa	5.0	0.9	-1.0	-0.5	-1.0	-3.3	-2.1	-0.4	0.0	-14.5	-1.5	8.9	8.8	-2.5	-15.4	6.3	1.7	0.6
Rest S.S. Africa	13.3	2.6	-4.2	-6.5	-1.7	2.1	-2.5	-0.6	1.1	-8.2	-1.5	3.5	-17.4	-6.2	2.5	13.9	2.6	-4.8
High-income countries	3.4	0.1	-1.8	1.1	0.7	0.1	-0.8	0.2	0.8	-8.4	-1.1	4.3	9.9	2.8	-3.9	3.4	-0.6	-2.4
Developing countries	9.4	2.4	-3.0	-3.4	-1.1	1.0	-1.6	-0.5	0.6	-8.7	-2.2	3.2	2.3	-2.2	-4.5	13.3	3.4	-4.8
World	6.7	1.3	-2.4	-1.3	-0.3	0.6	-1.3	-0.2	0.7	-8.6	-1.8	3.6	8.3	1.1	-4.0	8.9	1.6	-3.7

Source: (Valenzuela and Anderson, 2011).

Figure 1. Supply driven effects in tropical countries

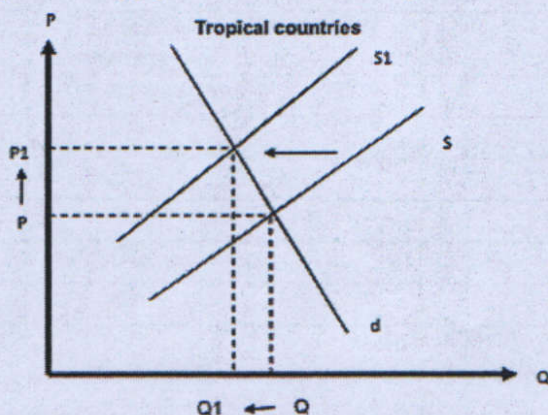


Figure 2. Supply driven effects in temperate countries

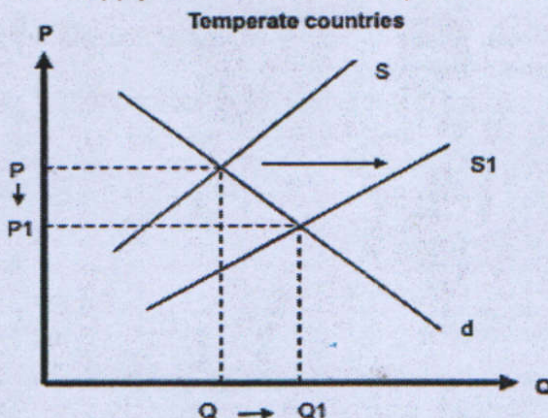
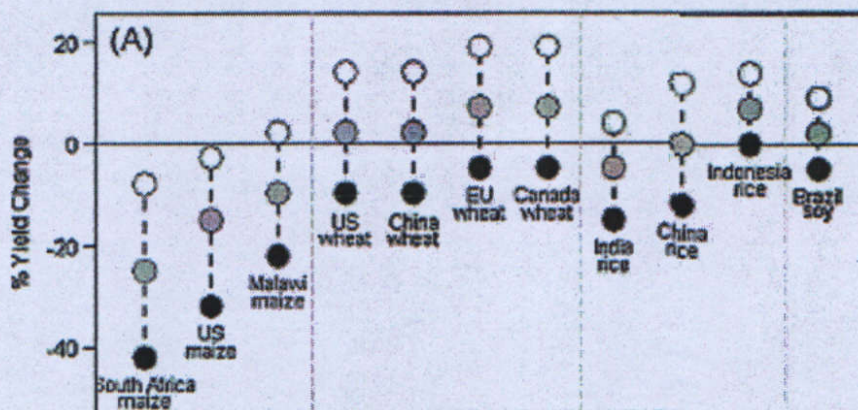
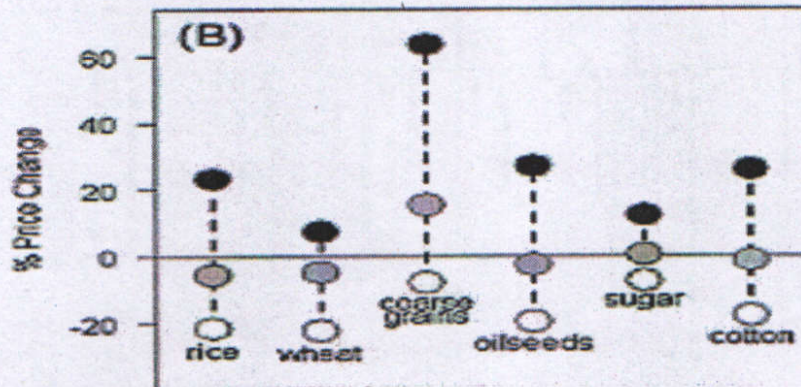


Figure 3 showing the yield changes for maize, wheat, rice and soybean for 2030.



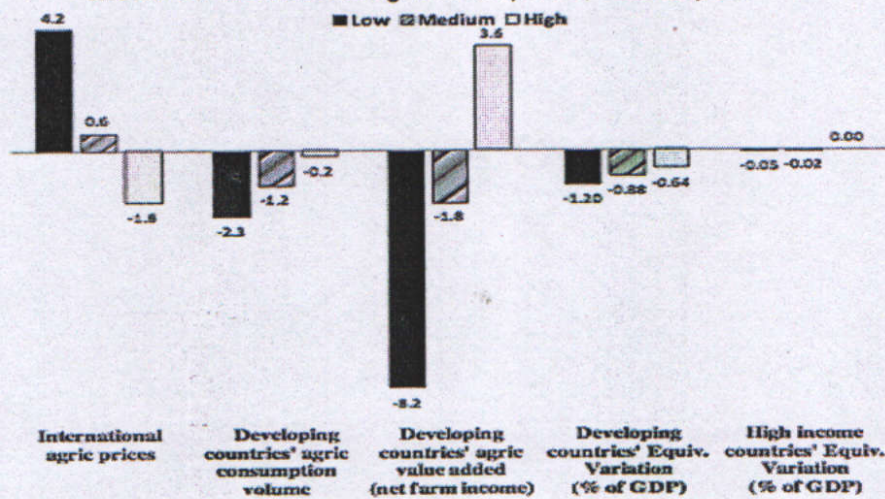
Source: Long et al. 2006

Figure 4: showing the price changes for rice, wheat, coarse grains, oilseeds, sugar and cotton.



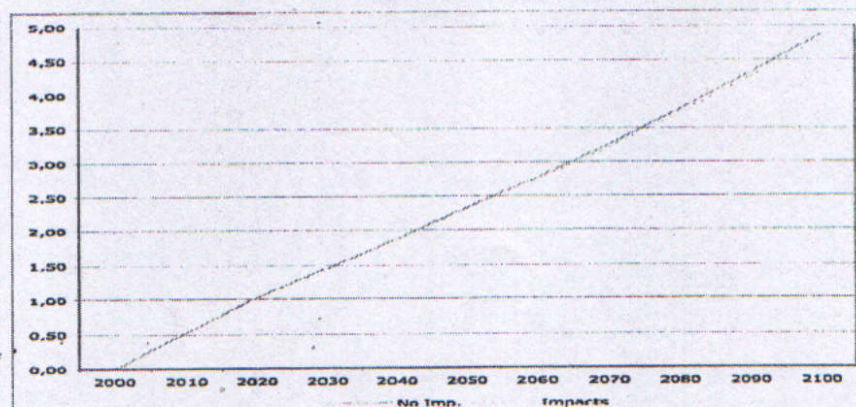
Source : Hertel et al. 2010

Figure 5 showing some effects of a 3% decrease in unskilled labour productivity and low, medium and high crop yield productivity shocks on international agricultural prices, consumption



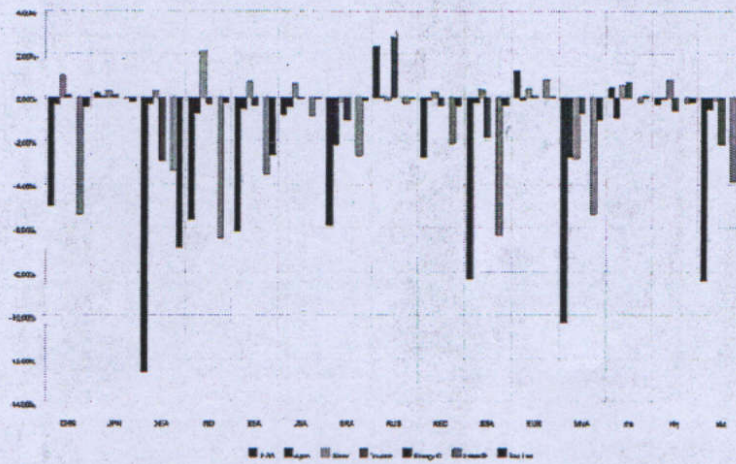
Source: (Valenzuela and Anderson, 2011)

Figure 06 showing total increase suspected upto the year 2100.



Source: (Roson and van der Mensbrugge, 2010)

Figure:7 showing the negative/combination effects on various factors for the estimated real GDP.



Source: (Roson and van der Mensbrugge, 2010)

Figure 8 showing the demand and supply driven effects in developing countries

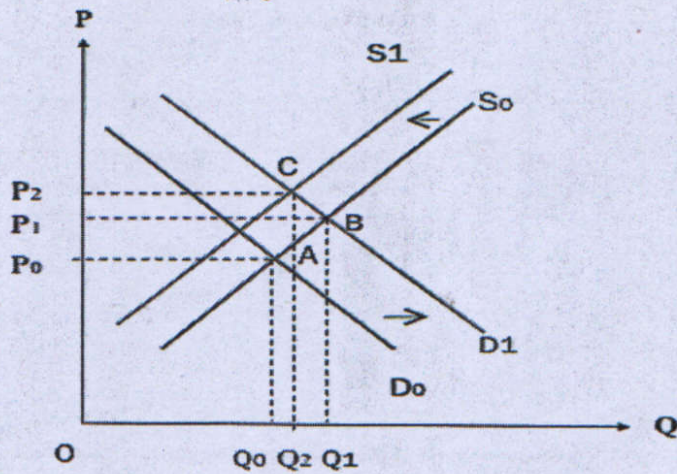


Figure 9. Showing the supply driven effects in the developed countries

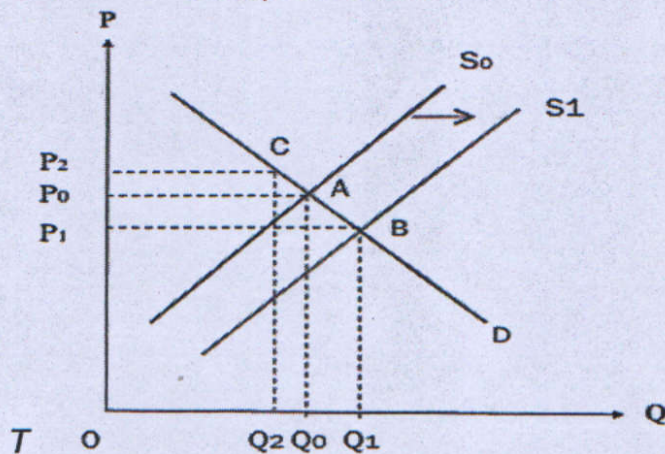


Figure 10 showing projected impacts of climate change and Economic development on food security, 2010–2050 (average kilocalorie availability per person per day)

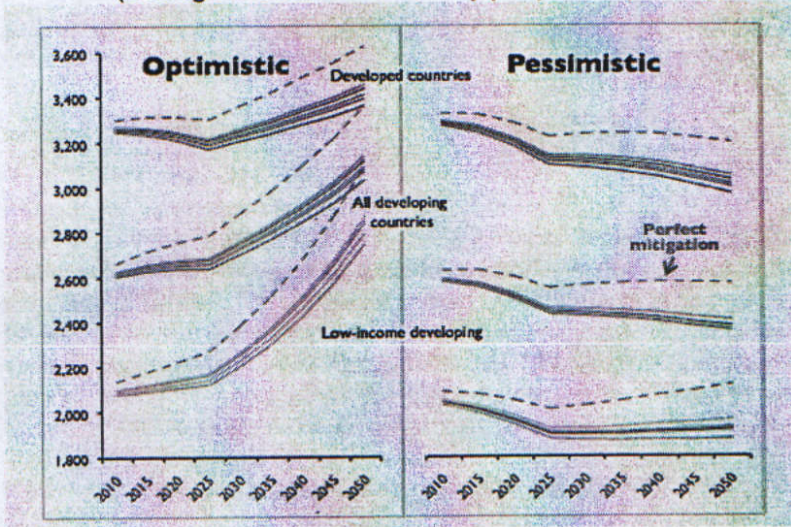
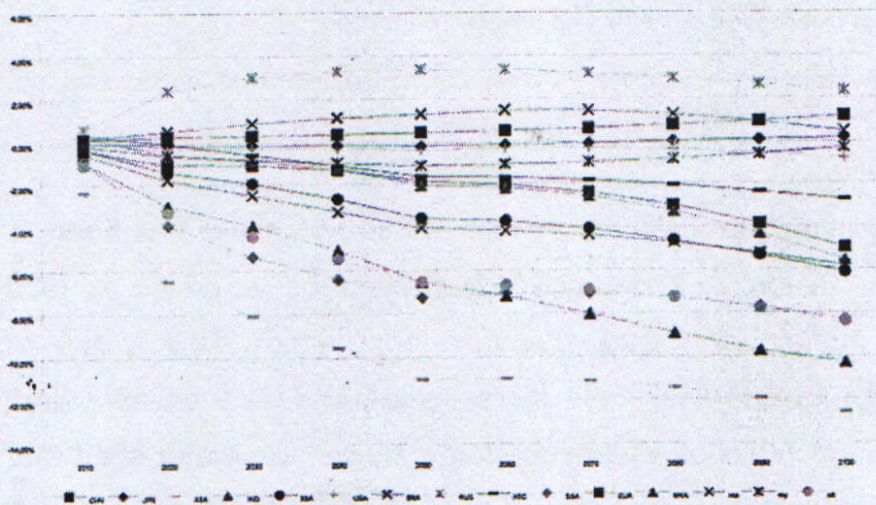


Figure-11 showing the %age deviation of real GDO at 10 years interval.



Source: (Roson and van der Mensbrugge, 2010)

THE IMPACT OF POLICY INDUCED ACTION PLAN IN ENVIRONMENTAL PROTECTION TOWARDS IMPROVEMENT IN FOOD SYSTEM BY THE YEAR 2030

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ABSTRACT

This research cum status paper describes the environmental protection efforts made in Pakistan in the light of the Millennium Development Goals (MDG), and National Environmental Action Plan (NEAP), with stress towards indicators in the sustainability and multi-disciplinary strategic actions being taken in this regard. This paper also includes improvements already made, towards food systems, with an overview of fertilizer and pesticides used in agricultural production. In the light of reports and data on environmental protection the poverty reduction has also been linked as a sustainable approach to the year 2030, Pakistan Environmental Protection Act (PEPA) 1997, the Ministry of Climate Change, GOP, has made considerable achievement, by establishing National Bio-safety Centre (NBC) under contagious Protocol on Bio safety (CPB) since May 2009. So far out of 292 cases, 215 cases have been decided by National Bio-safety Committee; 40 such Institutional Bio-safety Committees have been established in the country. Environment Impact Assessment (EIA) Directorate issued initial 59 Environment Examination (IEE) approvals of 27 cases, examined 73 petrol pumps and 133 CNG stations studied as test case and approved 05 Environmental Management Plans since 2000 up-to 2014 for minimum residues of lead and other health hazardous chemicals, including cases for Oil and Gas Regulatory Authority (OGRA), and NEPRA. This paper ends with recommendations for Pakistan and elsewhere, towards Environmental Protection, for better food systems and poverty reduction.

Keywords: Environmental Protection Policies, action plan, improved food system, poverty reduction, Pakistan.

INTRODUCTION:

Since its inception, the primary role of the agriculture has been to feed and fuel the world (Orubu & Omotor, 2011). It can be a driver to food security, environmental sustainability and economic opportunity. This is the only sector versatile enough to address these three issues and at the same time reducing poverty. Agriculture provides vital ecosystem services like water shed management. It requires technological innovation and resources for the farmers to adapt to the changing climate, although agricultural production needs to cater for the need of the planet but still it can be a linchpin of sustainability. Despite challenges and common problems affecting agricultural productivity losses, land management practices, green houses gas emissions, nitrogen soil efficiency and climate change, it is the need of the hour to shift the way the system is managed, pointing towards the sustainability-environmental sustainability and food security.

With more economic opportunities, access to technology and information, the poor will be able to adapt to new situations and manage their resources in

sustainable manner. As income rises, they will be willing to pay for protection of environmental services. Therefore strong partnership between government and communities is required with strong inter and intra regional cooperation to meet the challenge based on environmental regulations for improving food security a possible yet challenging task (M/O Environment GOP-2013-14).

This paper will firstly, lay the concept of poverty-environment nexus, secondly analyze the different perspectives recent trends and future trajectories in land use, crop yields, nitrogen fertilizer use, carbon sequestration, and greenhouse gas emissions to identify key issues, opportunities and challenges and finally conclude with main findings.

MATERIAL AND METHODS:

The following documents including material from internet were excessively consulted for preparation of this article:-

- i. Various journals and reports pertaining to environment.
- ii. Reports on food security, Pak. Economic Survey Reports (2011-12) (2012-13) and (2013-14).
- iii. Various fiscal reports and annual reports of Pakistan Bureau of Statistics (PBS) and National Institute of Population Studies (NIPS).
- iv. Proceedings of various seminars/conferences and workshops related to this subject.

LITERATURE REVIEW:

In many parts of the world, agricultural production, employment and common lands are the main sources of livelihood for the rural poor, than do the rural non-poor. Therefore the poor's livelihood depends largely on the direct and indirect production linkages and even more on consumption linkages from farmers. Poverty is considered as an important constraint on agricultural development, so poor people need to ensure subsistence security, mobilizing production and financial resources as put forward by Reid & Sachs (2006). Much of the deliberations reflected a 'downward spiral' of poverty and environmental degradation. According to this concept, population growth, as well as limited access to land or access only to poor quality or fragile lands, or limited resources for sustainable resource management force poor people to put increasing pressure on the natural resource base. The resulting environmental damage leads in turn to waning consumption, human health

and food security. Policy responses to this situation are control of population growth, resettlement, controls on resource access and use by the poor, environmental education, support for conservation investment for the poor, and non-farm income growth.

According to Lele (1991) a wide range of environmental outcomes were achieved under management by the poor and of welfare outcomes following environmental degradation. Orubu and Omotor, (2011) argue that new evidence of complex yet variable poverty–environment relationship has been a rising focus on 'sustainable rural livelihoods and illustrate poverty–environment nexus, set of mutually reinforcing link between poverty and environmental damage. According to this concept, poverty reduction and environmental protection are corresponding to each other. For environmentalists, the nexus has provided a base for or against arguments, based on the "Environmental Kuznets Curve," (EKC) illustrated below. According to Reid & Sachs (2006) investing in poverty reduction is crucial for environmental policy, while investing in the environment is vital for successful poverty reduction. Therefore the new vision for agriculture strives to bring together the power of agriculture to drive food security, environmental sustainability and economic opportunity (World economic forum report 2010). Garcia *et.al* (2011) emphasize that poverty alleviation programs should be accompanied by environmental regulations that correctly price externalities or clearly establish property rights to environmental goods (carbon markets).

Agriculture currently appropriates a substantial portion of the Earth's natural resources. According to Chaterjee (2009) crop production, pasture, and livestock grazing systems occupy 38% of total land area. Water used for irrigation accounts for 80% of all freshwater consumption and nitrogen (N) fertilizer applied to agricultural land comprises more than 50% of the global reactive N load result of human activities. The use of these resources has a number of negative environmental consequences. Cassman *et.al* (2003) say that although production trends of the past 40 years have kept pace with food demand, the issue is whether the projected increases in food requirements can be met while protecting natural resources for future generations.

Grain demand is expected to increase at a faster rate than population growth because economic development and urbanization will result in greater per capita

consumption of livestock products in developing countries, where more than 95% of the population growth will occur. Feed grains are projected to account for 35% of the increase in global cereal production to the year 2020 and world cereal demand is projected to increase by about 1.3% annually to the year 2025.

To assess prospects for conserving natural resources and improving environmental quality while meeting increased food demand, recent trends and future trajectories in land use, crop yields, nitrogen fertilizer use, carbon sequestration, and greenhouse gas emissions are elaborated to identify key issues and challenges Jayaraman & Lanjouw, (2004) depicted, in figure 2 land reserve available for crop production was estimated at 1664 Mha, which is larger than the amount of cropland in current production. Therefore availability of arable land is not a constraint to expansion of cropped area. Instead, cereal prices have the greatest influence on cropped area expansion.

Griffiths & Coppers (1994) likewise state that, sustained cereal production is questionable in the semi arid zones of sub-Saharan Africa where population pressure has forced increased cropping intensity on soils of low fertility. Moreover, the process of industrialization and urbanization will continue to influence on existing highly productive agricultural land while expansion of cropping will occur on more marginal land. Similar development processes will reduce arable land reserves for agriculture in other densely populated regions of South and Southeast Asia, which are currently major centres of cereal production.

Native forests and wetlands account for a large portion of the remaining land reserves worldwide. Preserving a large portion of these forest ecosystems is crucial for protecting the biodiversity and environmental services they provide. In addition, much of the remaining uncultivated land has severe constraints to crop production from soils that have physical or chemical properties that would limit plant growth without ameliorative amendments as reported by Griffiths & Coppers (1994).

Sustaining productivity on such land requires proper soil management technologies and improved use of nutrients and other amendments to maintain soil quality. It should also be noted that the current status of land degradation is not precisely known because the most comprehensive survey to date, the Global Assessment of Land Degradation (GLASOD), was conducted more than 12 years ago. Increased yields, however, depend on maintaining an exploitable yield gap and

the use of management practices that maintain soil quality and reduce the negative effects of crop cultivation on environmental quality.

Lack of an increase in rice yield potential is a concern because yield stagnation is occurring in some of the world's most productive rice-producing regions as a result of a diminishing exploitable yield gap. Although aggregate rice yields in China appear to continue at a linear rate of increase established during the past 35 years (Figure 3). Likewise, yields are increasing very slowly in Japan and Korea, where average farm yields are also stagnating in major rice-producing provinces of India (Punjab), the Philippines (Central Luzon), and Indonesia (Central Java). Because yield stagnation in these areas is not associated with a diminishing exploitable yield gap, available evidence suggests productivity constraints from factors such as deterioration of soil and water (Ingram, 2007).

Maintaining an exploitable yield gap as average farm yields approach 80% of yield potential depends on achieving increases in yield potential through genetic improvement. Annual wheat demand projected to rise by a compound annual rate of 1.1% to the year 2025, the exploitable gap between yield potential and average farm yields will also diminish in high-yielding wheat systems. In Pakistan wheat yields is progressing with an annual production of 28.25 million tons as in the year 2013-14. The wheat production in the wake of population boom, will be required to the tune of 40.2 million tons by the year 2030(Shafiq Qadir Memon et-al 2013-14).

Adequate Nitrogen (N) supply is required for achieving high cereal yields, but negative effects from improper N fertilizer use threaten environmental quality and human health at both local and global scales, as a result of water pollution from nitrate leaching or runoff, air pollution, and greenhouse gas emissions. Estimates for the United Kingdom and Germany suggest that the environmental costs of N fertilizer use are equal to one third the total value of all farm goods produced.

The degree to which crop production systems contribute to increases or decreases in greenhouse gas concentrations is another issue of concern given modern trends in atmospheric composition and putative changes in global climate. Over the past 52 years, atmospheric CO₂ concentrations have risen by 18%, which may contribute to global warming. Soil represents one of the largest pools of carbon. Such an analysis must consider the greenhouse gas emissions associated with all inputs and outputs used in the production system. Consequently there is

considerable potential to minimize the oxidation of existing and to increase the inputs of crop residue-C through changes in crop and soil management Scherr (2000).

Damage inflicted by human on natural resources render activities to be unsustainable, which need to view the world from sustainability perspectives and express linkage between social and environmental issues (Dovers & Hampers 1993). Therefore; in order to counter these challenges of increasing environmental regulations while improving food security it is necessary according to Newman (2006) to develop partnership with the local environment therefore, sustainable development refers to fostering adaptive capabilities and creating opportunities. Sustainable development is never a completed process. It is a moving target and each adaptation is a temporary solution to changed conditions. Smith (2010) also acknowledges that a common view of sustainability is based on the division of sustainability into economic, ecological, and social dimensions. Sustainability exists when human well-being (corresponding to the social and economic dimensions) ecosystem and health (corresponding to the environmental dimension) are sustained.

Experts both at home and abroad estimate that environmental degradation may cost Pakistan over economy Rs. 365 billion every year. This degradation comprises air and water pollution, ozone depletion, deforestation, desertification, vanishing bio-diversity and land degradation. Pakistan has never been an exception in receiving global impact on environment, has already made commitments in taking in countering drastic affect. A universal targeted development approach, Millenium Development Goals (MDG), the strategic achievable objectives. The action plan on National Climate Change policy has been initiated together with the Provincial Environmental Protection agencies. Some of the points are: Air and water quality monitoring, clean drinking water for all, Pakistan wet land programs, National sanitation policy, sustainable land management, environmental rehabilitation, poverty reduction, the national values and targets are presented below:

The efforts made in the developed world as well as developing nations in South Asia are on the way to make their countries environment friendly and actions are being taken. I Pakistan following steps are being taken; Strategy to protect ecosystem, save natural resource from depletion, preservation of forests and wet lands, Review international obligation of Pakistan on forest, biological diversity and its Aitchi Bio diversity targets (2030), Continuous monitoring of industrial areas steel

mills marble industry to protect environment, out of a total of 292 case, 215 cases have been decided by National Bio safety Committee. 40 Institutional Bio safety Committees have been established in a country. Environment Impact Assessment (EIA) Directorate issued initial 59 Environment Examination approvals (IEE) of 27 cases, examined 73 petrol pumps and 133 CNG stations and approved 05 Environmental Management Plans since the year 2000 up to 2014. In addition tasks of working group on forest and ecosystems reviewed National climate change policy 2012 and National Sustainability strategy (NSDS).

We must have to look into the losses due to environment which is not friendly to agricultural production and food systems at home and abroad. Some of the pollutants must be on our tips namely; excess of carbon, nitrogen, sulphur, untreated affluent and sludge used for irrigating crops, vegetable and kitchen items, fertilizer and pesticides used for more production. As a result flies, bugs and other insects are developing resistance. Let us have a look at the quantity of fertilizer made available to farms.

Almost 100% soil in Pakistan is deficient in Nitrogen, 90% deficient in phosphorous, and 30 % potassium. Wide spread deficiencies of micro- nutrients are also appearing in different areas. Soil fertility is continuously depleting due to minimizing essential plant nutrients from soil under intensive cultivation. We have brought to this paper only figures of urea with 46% nitrogen, DAP with 18:46 % while other entities in fertilizer include Ammonium nitrate, calcium ammonium nitrate, sulphate of potash and nitrogen phosphate and potash.

We can watch both the quantities of increasing amounts of fertilizer as well as the quantities of pesticides with heavy amount of state expenses, can only be avoided when the Natural Fertilizer are used continuously. This will not only make our environment cleaner but the soil will not become fertilizer addicted.

CONCLUSIONS AND RECOMMENDATIONS:

- i. The environmental needs have, and pressures on, poor farming communities will certainly intensify in coming decades.
- ii. Although the relationship between poverty and environment is highly variable, the 'downward spiral' is both avoidable and reversible in many circumstances.

- iii. Poor people have marvellous potential for adaptation and innovation. Public policies can positively influence the micro-scale factors that determine how farmers adapt to environmental pressures.
- iv. More pro-active policies are required to achieve environmental and anti-poverty objectives simultaneously, enhancing the access to and productivity of poor people's natural resource assets and engaging them as partners in public resource management will make it possible to increase environmental regulations and food security.
- v. Increasing yields on existing cropland, limiting expansion of cultivated area, achieving a substantial increase in N fertilizer efficiency, and improving soil quality through C sequestration will be required to avoid severe natural resource degradation and to reduce emissions of greenhouse gases.
- vi. Lack of progress in raising yield potential is another threat to maintaining yield advances on existing agricultural land. Intensification presents a challenge to reducing the negative effects of N fertilizer. Technologies that improve the equivalence between crop N demand and the N supply from soil and fertilizer have the greatest potential to improve N efficiency.
- vii. Avoiding further expansion of agriculture into natural ecosystems is another key factor in limiting greenhouse gas emissions. Enacting policies to support the reversion of marginal lands and protection of natural ecosystems from agricultural expansion will place an additional burden on existing highly productive cultivated areas to meet future food demand linking poverty reduction and environmental management, (World Bank 2002).
- viii. To meet food demand and protect natural resources and environmental quality, poverty alleviation programs should be accompanied by environmental regulations that correctly price externalities or clearly establish property rights to environmental goods (i.e. carbon markets), coupled with policies that direct growth to existing agricultural land while avoiding expansion of cultivated area into natural ecosystems. It also will require huge funding in research and extension to support scientific advances and adoption of innovative new technologies in time.

REFERENCES:

- Cassman (2003), "Meeting cereal demand while protecting natural resources and improving environmental quality," *Annual Review Environ Resources*, Vol. 28:3, pp. 15–58,
- Chaterjee, C (2009), "The global food equation Food security in an environment of increasing food production Deutsche Bank Research Report,
- Dasgupta (2005), "Where is the Poverty–Environment Nexus; Evidence from Cambodia, Lao PDR, and Vietnam", *World Development*, Vol. 33, No. 4, pp. 617-638,
- Garcia, j (2011), "The ecological footprint of poverty alleviation evidence from Mexico oportunidade program,"
- Ingram, J (2007), "Challenges for analyzing environment and food security," ESSP-Global Environmental Change and Food Systems, NERC/University of Oxford,
- Jayaraman, R and Lanjouw, PF (2004), "Small-Scale Industry, Environmental Regulation and Poverty: The Case of Brazil", *The World Bank Economic Review*, Vol. 18, No. 3,
- Newmann, L (2006), "change, uncertainty and futures of sustainable development," *Futures*.
- Orubu, and Omotor, DG (2011) "Environmental quality and economic growth: Searching for environmental Kuznets curves for air and water pollutants in Africa," *Energy Policy*, Vol. 39, pp.4178–4188,
- PMSEIC (2010), "Australia and food security in a changing world": the Prime Minister Science, Engineering and Innovation Council, Canberra,
- Reid, WV and Sachs, JD (2006), "investment towards sustainable development", *Policy Forum*,
- Smith, T (2010), "Using critical systems thinking to foster an integrated approach to sustainability: a proposal for development practitioners," *Environ Dev Sustain*, vol:13, pp. 1-17,
- World Bank (2002), "Linking Poverty Reduction and Environmental Management Policy Challenges and Opportunities, W.B. documents series.

Table No.01 showing the recent status of indicators in sustainability of Pakistan environment (2013-14)

S.#	Indicators	Latest national values	Target	Status
01	Forest cover %	5.2	6.0	Off trend
02	Land area protected for wildlife conservation	11.6	12.0	On trend
03	GDP per ton of oil equivalent	26543	28000	On trend
04	Sulphur content in high speed diesel	0.6	0.5	On trend
05	Proportion of population with access to improved water	89	93	On trend
06	Proportion of population with access to sanitation	72	90	off trend

Source: Pakistan millennium development goals report 2013- Pak.

Table No.2 showing the fertilizer situation during previous year .Tons in Pakistan

S.#	Particulars	Kharif 2013		Rabi 2014		Kharif 2014	
		Urea	DAP	Urea	DAP	Urea	DAP
01	Opening	220	197	175	317	376	56
02	imports	325	326	862	526	125	00
03	Domestic production	2496	398	2439	292	3141	375
04	Total availability	3041	921	3476	1125	3116	431
05	Offtake/demand	2851	616	3099	1095	3000	600
06	Write on	-15	02	-1	06	00	00
07	Closing stock	175	307	376	56	141	-169

Source: National fertilizer development centre Pak. Economic survey Report 2013- 14.

Table No. 3 showing the imports of pesticides in country over previous year

S.#	Fiscal year	Imports (Million tons)	Value (millions) Rs.
01	2011-12	32,152	12,255
02	2012-13	18,731	08,587
03	2013-14	16,408	08,585
Total		67,281	29,347

Source: Pakistan bureau of statistics

Figure1: Showing income level curve versus environmental degradation

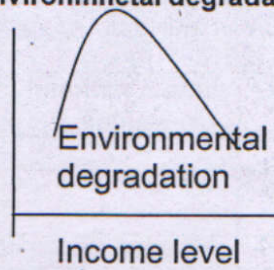


Figure 1: EKC, (Source: courtesy EKC)

Figure 2 showing world hunger map 2009



Figure 2: Source, global environmental change and food systems 2007

Figure 3: Global cereal production trends: Source: (PMSEIC 2010)

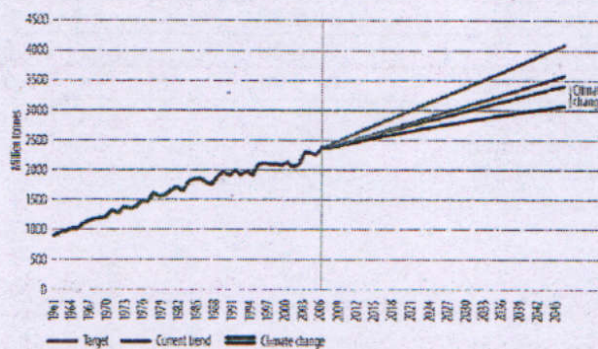


Figure 2.13 Global cereal production – past and future. The trend lines represent the World Food Summit target (green), an extrapolation of the current rate of productivity increase (blue) and two possible scenarios resulting from climate change – a five per cent decline (red) or 15 per cent decline (black) over the next 40 years (Based on data from FAOSTAT, 2010).

EFFORTS MADE IN THE IMPLEMENTATION OF ENVIRONMENTAL REGULATIONS IN PESTICIDES: AN APPROACH FOR SCIENCE EDUCATION

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ABSTRACT

The paper revolves in encompassing the climate change, and the efforts made in the implementation of the Environmental Regulations with special reference to pesticides. Most of the reviewed work indicates market based economic approaches to the use of the pesticides and other alternate uses that cause environmental contamination. Efforts have been made to gather information on regulations implemented, with good results at home and abroad, in the light of international symposia and conferences, as well as cost effectiveness with economic point of view. The paper also discusses, amidst the wide range of the advantages and disadvantages of related issues, the abatement activities and subsidies by various governance systems. The situation of environment the regulation's made and implemented by the National Environmental Action Plan (NEAP), devised based on achieving Millenium Development Goal (MDG)- to achieve sustainability in Environmental Protection by the GOP towards seven indicators namely i- forest cover, ii- land area protected under wildlife conservation, iii- energy efficiency, iv- sulphur content in high speed diesel, v- proportion of population with access to water sources, vi- sanitation, vii- regularization of proportion of kachi abadis. Implementing Pakistan Environmental Protection Act (PEPA)-2009 in the light of Contagious Protocol on Bio-safety (CPB) has established National Bio-safety Center (NBC) since 2009. The regulations on inspection of Genetically Modified Organism (GMO) are in place since 2006 and so far out of 292 cases of GMO, 215 cases have been decided by the Bio-safety Committees. (40 such committees have been formed in the country) and are functional. Details are available in the paper in form of Action plan inspecting 173 for petrol pumps, 157 CNG for hazardous contents of sulphur and other related issues the paper ends stations with recommendations, especially in pesticides.

Keywords: Environment regulations, implantation, Pesticide issues, MDGs Pakistan.

INTRODUCTION:

The issue of pesticides and associated risks was first raised by Rachel Carsons, in the Silent Spring in 1962 while introducing this issue to the broader public, asserted by Zilberman et.al (2007). Since then concerns relating to use of agro-chemicals in particular have been a focus in the area of ecological sustainability. This is because the use of pesticides has been spreading at greater pace in the world. The main reasons have been increased productivity of agriculture because of pressing food demands and pesticide subsidies provided by governments due to pressure from multinational companies, which in turn bore policy implications for pesticide control. However the increased consumption of pesticides have resulted in multiple economic, environmental and public health problems, putting more social cost to the society in general (in form of negative externalities) which are beyond private cost incurring on farmers. This paper discusses not only the implementation of environmental regulations but also externalities caused by pesticides, highlight economics of pesticide policy and elaborate command and

control, market based, property right and decentralized approaches along with their limitations.

LITERATURE REVIEW:

According to Hodge (2003) some governments, recognizing the detrimental effects of pesticide residues, have tried to adopt centralized efforts intended to control pollution through command and control methods (with little coordination with local communities/stakeholders) which did not offer the efficient solution.

Zilberman *et.al* (2007) state the uncertainty of the level of pollution caused by pesticides being non point pollutant and their heterogeneity makes it difficult to devise a "one size fit all policy" that meets these issues. Therefore the urgent issue is to adopt an approach to correct the market failure as a result of externalities caused by the use of pesticides to minimize the social, ecological and economic impacts which is very challenging according to Margraff *et.al* (2011).

In light of this it is generally agreed that a combination of approaches like command and control, market based approaches, property right and other decentralized approaches will be more effective in controlling the pesticides residue problem as they will complement each other. Each of them will be evaluated on the basis of the criteria of (i) cost effectiveness (ii) efficiency (iii) equity (iv) flexibility, and (iv) incentives for improvements.

Pesticide applications also result, in indirect effects on ecosystems by reducing local biodiversity and by changing the flow of energy and nutrients. Ecosystem impacts of pesticides can include effects on human health, domestic and wild animal response, effects on natural enemies or pests, crop pollinators, and on soil microorganisms response. Though pesticides are a major contributor to the ability of the agricultural community to feed a growing world population, they impose a variety of costs on society. Economic analysis of pesticide

The economics of pesticide policy and regulations.

The environmental pollution and human health risks associated with chemical pesticide applications present a strong case for policy intervention to reduce pesticide-use to levels acceptable to society. It is important to identify and price the negative externalities produced because they affect the environment as a whole and the price will in turn provide incentive to shift to other methods. Because the external costs of a pesticide application often are not borne exclusively by the farmer or firm that makes the application decision, pesticides will be used in excess relative to the level preferred by society.

Over the years, a number of instruments have been suggested to reduce pesticide-use levels, but none has been able to overcome these challenges to achieve a first-best solution in isolation (Field & Field 2009). The efficient use of pesticides occurs where the (expected) marginal benefit of pesticide use (including future benefits) and the (expected) marginal social cost of pesticide use are equated. Consequently the first-best policy which achieves the social optimum with no deadweight loss. However Margraff *et.al* (2011) argue that all policies are defined against the first best, with second-best policies comprising those that minimize deadweight loss.

Proposed policy approaches to address pesticide residues problem.

The main objective in the proposed pesticide policy is to reduce the contamination of pesticide residues as cost effectively and efficiently as possible. For wider environmental impact these policy interventions will offer additional synergy to existing agricultural and environmental policies.

Command and Control Approach.

This is a centralized conventional approach where regulatory authority mandates the behaviour of polluters under the laws of that country. The regulatory authority can use enforcement machinery to bring compliance like sanctions/fines and criminal prosecution. To reduce pollution due to pesticide residues, emission standards can be applied with advantages discussed below as can be seen in "Figure 2".

The Emissions standards are performance based standards which specify the end result or a limit is applied directly to the emissions coming from pesticide pollution sources. Emission standards are expressed in terms of quantity of material per time like tonnes per minute. Usually standard is expressed in terms of allowable emissions per unit of output. The polluter can reduce it in two ways: by reducing inputs per unit of output and by reducing emissions per unit of input. Consequently the incentive for farmers has been broadened. So in the case of pesticides, an output based standard would involve both incentives: to reduce emissions per unit of pesticide applied or become more efficient by shifting to other pest management techniques through abatement activities and subsidies approach in market based methods. A level of pesticide is set and farmers are expected to reduce the use of pesticides below that level.

"Figure.3" below indicates the initial level of emission of pesticide is e_0 , rate above the efficient level of e^* . At e_0 the total abatement cost is zero. To achieve e^*

authorities then set emission standard at level e^* which becomes the mandated upper limit of emissions (Field & Field 2009). At e^* , the total abatement cost is area c . Enforcement will be done by sending authorities to detect violations and fine the violators. Firms then reduce pesticide emissions according to emission standards. It will incur a cost equivalent to area c /year in total abatement cost. The way to reduce on compliance is to raise penalties through monitoring or detecting non compliance by raising the fine levels. The penalty level will be raised to e^* which ensures a non compliance rate of zero.

While some of the Advantages are i- Cost effective, if standards vary according to situation then marginal abatement cost will vary and will result in less pesticide residue emissions, ii- Easy and simple to enforce with flexibility, iv- Community can monitor the standards and report the violations to regulators, v- Efficient because it will maximize reduction of pesticide residues in minimum time, vi- Fair in sense of equal distribution of cost benefits across society, vii- Provides incentive, to shift and innovate to other pest management techniques (under research and development initiatives) and the disadvantages are i- Uniformity of standards does not take into account in different circumstances, ii- Less flexible to change, iii- The advantages outweigh the disadvantages and so this method is applied.

Putting charges on emissions from pesticide residues leading to environmental pollution is not practical because of difficulty in measuring the emissions. In this scenario, product charges, under market based approach as per seem to be more feasible because pesticides are taxed on purchase in the form of a charge per ton. The abatement cost is therefore internalized.

There is a chance that some of the pesticide residues will end up in streams in the form of runoff but since the farmer is paying a high price so this is an incentive to use it in smaller amounts and also to use in a manner that results in less wastage. Thus input reduction leads to pollution reduction as stated by Field & Field (2009).

Some of the advantages are, i- Product charges are cost effective because they can reduce the pollution of pesticide residues at a lower cost and maintain equi marginal principles where marginal costs will be equal for all sources ii- It is an efficient method as maximum abatement will occur in less time (because the polluter is paying the price on purchase) which provides an incentive for less use of pesticides, iii- It is easy to implement and monitor.

The disadvantages are, i- Determination of the price can be problematic and burden of price can increase output adjustments and result in displacement of employment but this will be complemented by the abatement subsidies/activities' support abatement subsidy is a second policy intervention, under market based approach. Here public authority would pay a polluter certain amount per tone of emissions, for every tone the polluter reduced, starting from some benchmark level.

The subsidy acts as a reward for reducing emissions. More formally, it acts as an opportunity cost: (when a polluter chooses to emit a unit of effluent), they are in effect forgoing the subsidy payment (they could have had) if they had chosen to withhold that unit of effluent instead. It in fact changing the behaviour of consumers to not just think of profits but of the environment as well duly reported by Stavins (2001) common property rights, a decentralized and other bundle of legal rights describing what can and cannot be done with open resources, such as air, water and soil, in case of pesticide residue pollution.

Common-pool resources are characterised by difficulty of exclusion and generate fixed quantities of resource units so that one person's use subtracts from the quantity of the resource available to others. Destruction or degradation of the environment due to pesticide pollution is most likely to occur in open-access places where those involved and/or external authorities have not established an effective governance mechanism to regulate it.

Community based environmental management is a community based bottom up approach to solve the pesticide residue problem (is a solution to a problem by the community and within the community). The rights are negotiated and agreed particularly according to local conditions in line with collective choices and with mechanisms to settle conflicts. This whole process is facilitated by the government as regulator. In the case of pesticide residues control the government can facilitate the dialogue for setting the rights between the community and the firm polluting the resource adjacent to them. With stronger rights, communities can ensure enforcement by monitoring the emission standards for pesticides set by regulators under a command and control approach.

In the case of noncompliance the firm can be held accountable for fees/penalties according to agreed conditions. Therefore both these approaches can complement each other as public private partnership in achieving pollution reduction up to a socially efficient level. The monitoring cost will be shared by the company without putting an extra burden on the community (Field & Field 2009). For example,

Community Based pesticide effect monitoring is used as a pesticide management tool under the Pesticide Action Network (PAN) in Africa which is a successful endeavour (PAN international 2013).

Better dissemination of useful information regarding rights to agricultural producers, consumers and industry increases the awareness of mitigation of pesticide effects from bottom to top. Moreover, the education on permanent agriculture, best management practices and community based guidance can help to educate the masses. Eventually this can lead to meeting policy goals by encouraging environmentally beneficial actions, behavioural change particularly where there are currently information gaps or misperceptions regarding outcomes as put forward by Ireland *et.al* (2002). For example, rural communities are empowered to tackle pesticide related problems at grass root level from a risk-reduction perspective towards the "no-toxic environment" in South East Asia, an initiative of SIDA (SIDA 2012).

Status in Pakistan.

Efforts made in the implementation of the Environmental Regulations in Pakistan indicate that a National Environmental Action Plan (NEAP) has been devised to ensure Millenium Development Goal (MDG-7) pertaining to ensure environmental sustainability and progress measured against seven indicators i- forest cover, ii- land area, iii- energy efficiency, iv- sulphur content in high speed diesel, v- proportion of population access to clean water and vi- proportion of kachi abadis regularization. Under the Pakistan Environmental Protection Act (PEPA) 1997, the Ministry of Climate Change, GOP, has made considerable achievement by establishing National Bio-safety Centre (NBC) under contagious Protocol on Bio safety (CPB), since May 2009. So far out of 292 case, 215 cases have been decided by National Bio safety Committee, 40 Institutional Bio-safety Committees have been established in the country. Environment Impact Assessment (EIA) Directorate issued initial 59 Environment Examination approvals (IEE) of 27 cases, examined 73 petrol pumps and 133 CNG stations and approved 05 Environmental Management Plans since the year 2000 up to 2014. In addition tasks of working group on forest and ecosystems reviewed under National climate change policy 2012 and National Sustainability strategy (NSDS) of the country.

We can see that Pakistan is on track of achieving four out of seven MDG indicators, as presented in table- 1. Protected areas for wildlife conservation (11.6% against the target of 12%), reducing sulphur content in high speed diesel, improving

GDP per unit energy, improving access to safe drinking water (89% against the target of 93%). Further details on socioeconomic sector, mitigation/adaptation means GHG. Pakistan being low emitter (< 1%) of global emissions, state of environment specially air in big cities is 2 times higher than safe limits, specially the oxides of Nitrogen (NO₂) mainly due to CNG vehicles and formation of smog and haze, can be seen in Pakistan Economic Survey Report (2013-14).

RECOMMENDATIONS:

1. In conclusion, the combined pressures of feeding a growing world population and of protecting human lives and natural resources make pesticides a topical issue and increase the importance of wise pesticide use. No one instrument appears to be conclusively best in any sense given the number of trade-offs to resolve in terms of the achievement of different objectives.
2. There are a number of trade-offs to consider and resolve with each other, to achieve policy goals.
3. Explicit consideration of this retailer and consumer oriented pesticide policies may be introduced especially if they are less bureaucratic and more targeted.
4. Education and moral suasion is effective in influencing the behaviours of consumers and producers at less cost.
5. Community based management, a property right approach, can complement other approaches to solve the complex pesticide residue control issue because of the social cost involved through adoption of local mechanisms that recognize the heterogeneity of pesticide use.

REFERENCES:

- Director General (EPAR) (2011-12) Environmental Protection Agency Regulations, M/O Environment and climate change, GOP Islamabad.
- E, Brink, C, Hordijk, L and Kroeze, C. (2002), 'Environmental Economics for Environmental Protection', *The Scientific World Journal* (online), vol 2.
- Field, B.C. and Field, M.K. (2009), *Environmental Economics: An Introduction*, 5th edn, McGraw-Hill, Sydney.
- Hodge, I and Lohmann, U.L 2003, 'European agri-environmental policy for the 21st century', *Australian Journal of Agricultural and Resource Economics* (Online), Vol. 47:1, pp. 123–139.
- Marggraf, R, Amdur, L, Bertke, E and Freese, J (2011), 'Agri-Environmental Policy Measures in Israel: The Potential of Using Market-Oriented Instruments,' *Environmental Management*, (online) Vol. 47, pp. 859–875 (available).
- Shafique Qadir Memon, Farhatullah and Muhammad Hafeez (2015) Increased agricultural production, by year 2030; a futuristic approach in Pakistan, PJLSc. Vol-VI, No.06.

Stavins, R 2001, 'Experience with market based environmental policy instruments,' Handbook of Environmental Economics, Amsterdam: North-Holland/Elsevier Science (online).

Swedish International Development Agency (SIDA) 2012,' towards non-toxic environment in South east Asia (online).

WASTI, S (2013-14) Environmental Section, Pak Economic Survey Report Pak M/O finance and economic coordination, GOP Islamabad.

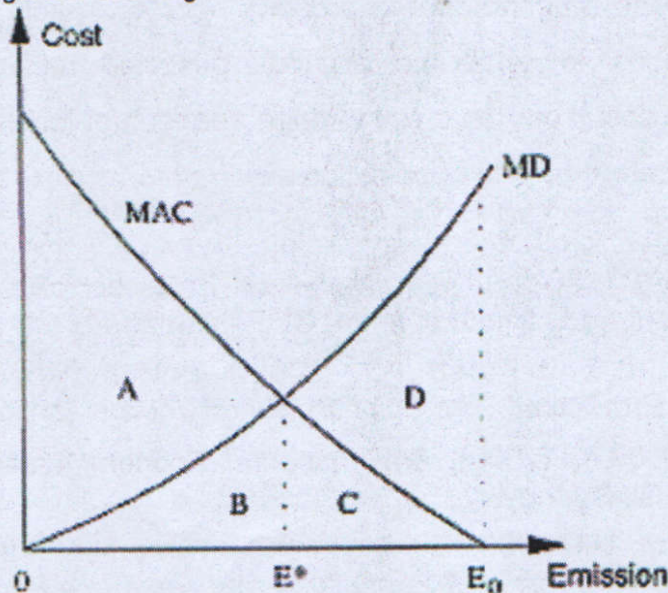
Zilberman, D, Steven, E.S and Lei, Z. (2007), 'The Economics of Pesticides and Pest,' *International Review of Environmental and Resource Economics* (online), Vol. 1, pp. 271–326 (Available).

Table No.01 showing the recent status of MDG-7, indicators in Pakistan (2013-14)

S.#	Indicators	National values	Target	status
1	Forest cover %	5.2	6.0	Off track
2	Land area protected for wildlife conservation	11.6	12.0	On track
3	GDP per ton of oil equivalent	26543	28000	On track
4	Sulphur content in high speed diesel	0.6	0.5	On track
5	Proportion of population with access to improved water	89	93	On track
6	Proportion of population with access to sanitation	72	90	off track

Source: Pakistan Millenium development goals Report 2013- Pak. Economic Survey Report 2013-14

Figure.1: Showing Pesticide residues emissions standards



Source: Field & Field 2009

EFFORTS MADE IN SUSTAINABLE RURAL DEVELOPMENT TOWARDS POVERTY REDUCTION WITH SPECIAL REFERENCE TO PAKISTAN

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ABSTRACT

This research cum review article encompasses as the work done on poverty reduction with a sustainable approach, not only in developed countries but also the developing countries specially of South Asia with particular reference to Pakistan. Sustainable Rural Development (SRD) addresses right from the state of concept, involving the effect of environment, the growth of Agricultural produce, the food securities for the poor and equal use and share of Natural Resources of an area by communities. The status of rural development towards poverty reduction in Pakistan has been introduced with facts and figures, in the light of Integrated Household economic survey (IHES) and Pakistan Living Standards Measurement (PLSM) on consumption based and calories based approaches. The poverty indices of the previous year's indicate improvement in the overall status in the country. Social Safety Nets Program (SSNP) started in the year 2009-10 through 2013-14 provides details of expenditure committed and released for various sectors in detailed, the tables indicate that the expenditure made in millions on roads and bridges was Rs. 23,231; on water supply and sanitation as Rs. 10, 376; on education Rs. 222,650; on health as Rs.71,403; on population planning as Rs. 2450; on social security and welfare as Rs. 29,732; on natural calamities and other disasters as Rs. 6,705; on agriculture Rs. 58,263; land reclamation Rs. 2088; on rural development as Rs. 3665 and on subsidies as Rs. 39,804, respectively. In the year 2012-13 peoples works program-I (PWP-I) and PWP-II continued with an expenditure of Rs. 3,346 and Rs. 42, 486 millions respectively. In the year 2013-14 the expenditure on low cost housing, justice, administration, law and others was Rs. 175; Rs. 10,904, and 106,659 millions respectively.

Key Words: Pakistan expenditure on sustainable rural development.

INTRODUCTION:

As the extent of human activities on the earth are increasing it is being realized that long term plans will be based on Sustainable Development (SD). Various problems and challenges associated with climate change, biodiversity loss and water shortage are being strongly felt than ever before and questions on certain set behaviours, complex systems continue to improve the understanding on socio ecological connections, the approaches of SD will continue to build and integrate the knowledge. However, SD is shift from traditional top down approaches, which is capable to address this issue in broad and dynamic manner. The SD came into policy table after the "Brundtland commission report on environment and development in 1987 as reported by Redelift (2005). Moreover, the publication of "world conservation strategy of IUCN (1980) our common future gave the concept considerable prominence" Mebratu (1998). This was the first opportunity to view the whole world from social, economic and environment perspective. After the report this concept was used on variety of ways, but sustainable development being rich concept helped to facilitate the discussion on human interaction with earth. "The

concept showed remarkable success in shaping the discursive space of 21 century” Zacai (2012). According to Brundtland Commission SD is defined as “to meet the need of present generations without compromising with needs of future generations”.

Under the social safety nets, as details are available in Pak. Economic survey report of 2013-14. Tracking the pro-poor segments, the GOP, the provincial Governments, NGOs and other committees towards poverty reduction on sustainable bases have shown that a minimum of Rs. 4.5 % of the GDP has been spent for social welfare and poverty reduction. Some of the programs include Benazir Income Support Program (BISP) Pakistan Poverty Alleviation Fund (PPAF), Waseela-e-Haq in Sindh, Waseela-e-Rozgar, Waseela-e-Sehat, Waseela Taleem and Zakat comprising of i- individual financial assistance, ii- establishment of Pakistan sweet homes, iii- endowment fund, iv- child support program including national centres for rehabilitation of child labour, vocational dastakari schools, workers welfare fund and microfinance initiative. We can say with confidence that the GOP, Provincial Government and NGOs are working on the agenda of achieving MDGs-I towards poverty reduction, on sustainable basis with improvement in environment at home, as being done in other developing countries. Similarly agricultural productivity will be increased and can be increased on sustainable basis, as pointed in an approach towards increased agricultural production, by the year - 2030, a futuristic approach for Pakistan, endeavored by Shafique Qadir Memon *et.al* (2015).

Efforts made towards Sustainable Rural Development in Pakistan.

In Pakistan, two official entities namely Household Integrated Economic Survey (HIES) and Pakistan Standard of Living Measurement (PSLM) are actively involved in Estimation of Poverty in the country. The official poverty line in the country is the calories and consumption based. The recommended nutritional requirements of 2350 calories /person/day. The % population below National Poverty Line is based on per day income/month income. This income was Rs.1274 US Dollars per year in 2010-11 and Rs.13650/month in the year 013-14. The overall population below poverty line is decreasing as compared to 2007-08 and 2010-11 presented in table No.2.

Similarly the poverty % is also decreasing per capita. In another report, published by the World Bank, world development indicators (2014), namely Poverty Head Count Analysis (PHCA), if we take US \$ 1.25 per day income then 21.04%

population was below poverty line in 2005. But when the poverty unit was raised to US \$ 02/ day in line with international standards for middle income countries, then 60.19% population falls below poverty line. In the same data available in table No.3, the position of poverty in Pakistan was better than India and Bangladesh, while Sri Lanka, China and Philippines were in better position than Pakistan.

Pakistan had adopted Millennium Declaration in the year 2000 and has committed to spare no effort to set free the most vulnerable segment of population from object and dehumanizing conditions of extreme poverty. Pakistan has adopted 16 targets and 41 indicators against which progress towards achieving the 08 goals of the Millennium Development Goals (MDG) is measured. The goal-1 eradication of poverty and hunger, target by 2015, is only towards achieving full and productive employment and decent work for all and to providing increased calories.

LITERATURE REVIEW:

The concept of SD first emerged in 1980, as an effort to viaduct the breach between environmental concerns and increased ecological consequences of the human activities and socio-political issues about growth and development. From the beginning, the criticism and skepticism was expressed from the communities. On Brundtland report was based on the statement: "global economic product would have to be increased 5-10 fold for SD" as forwarded by Robinson (2004) and another basis of concern for environmentalists and researchers (who were involved in with government and industry) was enthusiasm with which SD was picked and used in ways to move in opposite direction, particularly how development was equated with economic growth. During 21 century SD evolved as set of observations about nature and human relationship with it. The emergence of market economies and neoliberal policies in 1980 proved as water shed for the environmental politics. The World Conservation Strategy (WCS) was published in 1980 and was envisaged as a comprehensive action-oriented program for political change. The objectives of conservation were expanded from principally those of nature preservation to include aspects of human development through the ways in which human survival.

A snap shot of the issue over the past decade tells us that there is no clear pattern development on this issue. In academia focus was on deep ecology, social ecology eco feminism however, no clear argument emerged and progress remained slow. Governments of the world are less willing to take position on this subject and evidence of unhappy conventional development around the world (Robinson 2004).

SD means so many different things to many people and organizations. The literature is full with different efforts to define terms and debate have risen between those who prefer three pillar approach (socio, economic and ecological) and on relationship between humanity and nature. This can be beneficial a from diplomats point of view who are used to not define the basic terms in negotiations therefore, SD may benefit from the “constructive ambiguity”, Rabinson (2004).

At various places SD has been used instead to ecological sustainability or environmentally sound development. SD is sustained growth, sustained change and is taken synonymous with growth in material consumption. Using SD synonymously with sustaining growth performance is misleading or localized short form going against long term global objectives for SD. We can say it is simple socioeconomic change. Major contribution is realization that social conditions influence ecological sustainability and un sustainability of people interactions. The operational definition of SD was followed by mainstream organizations like UNEP, IUCN, WWF, CIDA and SIDA. The strength is in meeting needs and sustainability requirements.

According to Paten and Choe (2001) human interventions of any kind may also be considered as uncertainty elevating factors which include implementation of SD practices. Thus SD is oxymoron in deepest sense, ultimately it is impossible to sustain that which has been altered. The main serious concerns within the domain of SD is the promotion and propagation of what we can say is not sustainable. This has to do with “comic environmentalism” on the part of the government and businesses promoting rise of public concern over environmental issues

SD avoids questions related to power, exploitation, inequity political change instead critics, argument that offer agenda (that does not challenge any power structures) which are privileged to help the poor. This way it takes us on path which is not real which is critic of the anti globalization movement in the world related to socio political and economic characters of the western world Robinson (2004). So even if there is no contradiction in the term SD significant growth in economic activities were possible without running up to against ecological and socio political limits but it is not acceptable as it is at expense of human relationship with nature and therefore, SD is example of technological fixture.

The globalization movement is visible example of the resistance against the “business as usual” politics and economic decision making which is shift on issue

from only social and environmental to more generalized critique of characteristic of industrialized society Robinson (2004).

There is a need for more diversity to bring change and more democracy to insure change and adaptability and need for maximum optimization of resources versus space. We as humans hold contradictory views while taking actions which conflict our understating and beliefs and this is strength to bring change.

According to Newman (2006) it is the ambiguity in the term that lead to the flexibility and resilience. The controversy lead to dialogue at grass root level to develop partnership with the local environment therefore, SD Daly (1996) in Mebratu (1998) argue that It is enough to accept the SD as tool to guide us in future, and there is political consensus on desirability of SD concept Mebratu (1998) expresses that this concept presents growing frustrations being branded as "oxymoron". After, all the debate there is realization that damage inflicted by human on natural resources render activities to be unsustainable which created need to view the world from SD perspectives.

Already the world's resources are under stress. For example, at the present time about half of the available fresh water is already used for mankind's needs, and by 2050 half the world's people are likely to be suffering from water shortages. Although SD had been property of different discourses as oxymoron, it prompted number of debates, discussions and interpretations attached weight both to the sustainable and development. But today it needs to be linked to more material realities (which are products of science and technology) and associated shift in consciousness.

Ecological actors are key elements in rise and fall of ancient civilizations and in two major transformations the agriculture and industrial. In brief various religious teachings and beliefs are basis for human knowledge apart from scientific one.

It is undeniable that concept of SD received higher prominence after the publication of WCS of IUCN and WCED in 1980 and 1987 respectively. One goal of any approach to pursue SD should be to ensure that future generations have ample options. Adaptive approach that maintain un certainty as on going process is viable option which is about balance and building resilience.

The lasting influence of SD lies in its ability to evolve as concept. There are a lot of advancements in understanding regarding complex systems and practical application of this to ecological social systems. There is shift from top down to more

decentralized sort of empowerment at grass roots level for increase ownership of the issues. Rapidly growing communication systems and technology will play its vital role in linking small scale effort to larger global picture. In future SD will look like diverse complex and evolving.

PRACTICAL STEPS TAKEN BY PUBLIC SECTOR/THE GOVERNMENT OF PAKISTAN, IN SUSTAINABLE RURAL DEVELOPMENT:

The GoP, being aware of the sustainability in Rural Development (RD) has practically been involved, certainly every political regime since many decades, in budgetary allocation for various sectors of SD, which is elaborated as under:

(a). Roads/Highways and Bridges.

Since communication, specially road communication, is the basis for sustainability in development; budgetary allocation was made available to the tune of Rs.111,883 millions, Rs.94,750 millions and Rs.23,231 millions for the period 2011-12, 2012-13 and 2013-14, respectively as indicated in table No.01 and still this allocation has been increasing in the years to come.

(b) Water supply and sanitation.

The basic need of the inhabitants, as the population boom indicates, the country must be provided with the safe drinking water and ensure better sanitary conditions specially in rural areas. Under this sector Rs.36,570, Rs.34,055 and Rs.10,376 millions were allocated for the reported years i.e. 2011-12, 2012-13 and 2013-14 respectively. The increase or decrease of allocation depended on the elected representative's projects which are subjected to the Planning and Development's various Committees, within the dead line of Public Sector Development Projects (PSDP) of a fiscal year.

(c) Education.

The most important sector of the country which is getting attention of each elected Government and since many decades SD is taking place by allocating specific budgets each year, both by the federal as well as provincial governments. In the reported period Rs.393,523, Rs.04,79,853 and Rs.222,650 millions were approved for 2011-12, 2012-13 and 2013-14 respectively to be utilized on primary, secondary, higher secondary and vocational training schools and colleges, throughout the country.

(d) Health.

The target for the nation under Health and Nutritional Policy-2009, both the federal and provincial government are committed to provide basic health care

facilities not only to big cities but to each and every Basic Health Units (BHUs) of 6032 Union Councils (UCs) of 148 districts of the country where Village Health Centers (VHCs) are also providing basic health coverage to rural communities and the nation-wide Lady Health Workers Program (LHWP) along-with Expanded Program of Immunization (EPI) are working on sustainable basis. The budgetary allocation for the reported period had been Rs.134,182, Rs.161,202 and Rs.71,403 millions for the years 2011-12, 2012-13 and 2013-14 respectively.

Similarly budgetary allocation for (e) population planning, (f) social security, (g) natural calamities (h) agriculture, (i) land reclamation, (j) rural development, (k) subsidies, (l) people work program I and II, (m) low cost housing, (n) justice and administration and (o) law and order handsome amount has been allocated and utilized as appears in table No.01 with the result that the state is being run on sustainable basis.

To summarize the total expenditure for the year 2011-12 which was Rs.10.4% of the country's Gross Domestic Products (GDP) while it was Rs.12.0% of the GDP in the year 2012-13, as reported in the data obtained from Pak. Economic Survey Reports, for these years.

RECOMMENDATIONS:

- 1- SD seems to have lost parts of its value in particular for reasons of inefficiency in addressing major environmental problems. Of course there are other reasons for criticizing it like traditional approaches to SD is too ambiguous and an oxymoron.
- 2- Four ideological challenges the important items such as (i) radical rejection of development especially growth, second is (ii) transition management methods to address vagueness of the term (iii) third possibility is green economy, social and economic issues have to be seen as one and cannot be dealt in isolation because ignorance of one will result in unavoidable damage to other. Ideas surrounding SD have influenced modern environmentalism and mainstream understandings of the environment and its relationship to the concerns of development, particularly in less developed regions of the world.
- 3- Understandings of basic opportunities and needs in development, of persistent poverty, and distributive issues have come closer into environmental debates. Political compromises and balances are inescapable

there is no formula for democracy in SD and environmental policy must incorporate analysis of powers and interest priorities that emerge and must be implemented, no matter what circumstances may exist.

- 4- There are some important areas of common ground for policy makers that make good progress towards SD. For example, as there exists significant capacity for replacing human and physical capital for natural capital through preservation and exchange of resource inputs, reducing pollution, and improving environmental protection.
- 5- If sustainability is to mean anything it should act in integrated way that is the social dimensions must integrate with the bio-physical ones, which being the central message from the Brundtland report which as persuasive today as was in 1987. Solutions and strategies addressing only the social, economic and environment are not enough but trans disciplinary thinking focusing on connections and interconnections promoting synergy. It also needs integration across interests and sectors and government alone are not enough achieve sustainability on its own.
- 6- The private sector needs equal involvement and participation and without the tactic support of NGOs the true monitoring and transparency cannot be ensured. The broad partnership must involve active participation of all stake holders including research, teachers and community people.
- 7- The role of sustainability can be to bridge the gap between white spaces of various disciplines. There is need for new form of social learning which allows sustainability to be hammered out in diverse socio political and environmental circumstances.
- 8- Budget allocation for sustainable rural development must continue.

REFERENCES:

- Clayton, R (2001), "sustainable development Oxymoron," *Trans chem. E*, Vol. 79:B,
- Elliott, J (2009), "sustainable development" University of Brighton UK.
- J & Patten, BC (2001),"sustainable development : lessons from the paradox of enrichment, *Ecosystem Health*, Vol. 7:3
- J & Patten, BC (2001),"sustainable development : lessons from the paradox of enrichment, *Ecosystem Health*, Vol. 7:3
- Kates, RW (2001), "sustainable development," International Encyclopedia of Social and Kelavou Sciences.
- Lele, S M (1991), "sustainable development: a critical review", *World Development*, Vol. 19:6.

- Mebratu, D (1998), "sustainability and sustainable development: historical and conceptual review", *Enviorn Impact asses Rev, Vol. 18*
- Newman, L (2005)," un certainty, innovation and dynamics", *Sustainability, Science, Practice and Policy, Vol:1.*
- Newmann, L (2006), "change, uncertainty and futures of sustainable development," *Futures, Vol. 38.*
- Redelift, M (2005)," sustainable development (1987-2005): oxymoron of age" *sustainable development , Vol.13.*
- Robinson, J (2004), "Squaring the circle: some thoughts on the idea on sustainable development", *Ecological Economics, Vol. 48.*
- Shafique Qadir Memon, Farhatullah and Muhammad Hafeez (2015) Increased agricultural production, by year 2030; a futuristic approach in Pakistan, *Pak. JLS. Vol-VI, No.06.*
- Zacai, E (2012), "over two decades of pursuit of sustainable development: influence transformation, limits" *Environmental Development, Vol.1.*

Table No. 01 Showing the poverty related expenditure in millions rupees in various sectors for last three years

S. #	Sector	2011-12	2012-13	2013-14
01	Roads, highway and bridges	111,883	94,750	23,231
02	Water supply & sanitation	36,570	34,055	10,376
03	Education	393,523	04,79,853	222, 650
04	Health	134,182	161,202	71,403
05	Population planning	5,826	7,142	2450
06	Social security	68,437	70,911	29,732
07	Natural calamities	77,096	32,699	6,705
08	Agriculture	134,448	148,554	58,263
09	Land reclamation	4,347	4,805	2,088
10	Rural development	32,979	31,926	3,665
11	Subsidies	06,89,221	556,113	39,804
12	Peoples work program I	04,296	3,346	N/A
13	Peoples work program II	33,589	42,480	N/A
14	Low cost housing	383	603	195
15	Justice administration	17,082	22,512	10,904
16	Law and order	194,495	220,343	106,659
17	Total as % of GDP	10.4	12.0	N/A

Source: Ministry of finance – GOP- Pak economic survey report 2013-14

Table No.2 showing the poverty indices for last three years

Poverty indices	2007-08	2011-12	2013-14
Poverty line	Rs.1053	Rs.13200	13650.00
Overall % of poverty	17.20	12.40	11.20
Urban	10.00	7.1	5.4
Rural	27.00	15.1	13.7

Source: Planning Commission of Pakistan, Government of Pak.

Table No.3 showing poverty head count ration in South Asia including Pakistan

Countries/year	% of population below US\$ 1.25/day	% of population below US\$ 2.00/day
Pakistan 2008	21.04	60.19
China 2008	13.06	29.79
Bangladesh 2008	43.25	76.54
India 2010	32.66	68.72
Sri Lanka 2007	7.04	29.13
Nepal 2010	24.82	57.25
Philippines 2009	18.42	41.53

Source: World Bank, world dev. Indicators 2014

OBSERVATION OF INTEREST OF MATRIC AND FA STUDENTS IN AGRICULTURE AND LIVESTOCK SUBJECTS, AS REVEALED THROUGH PAPER EVALUATION AT AIOU

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ABSTRACT

This research paper was based on a comparative study carried out by the team of Agriculture Livestock paper evaluation group for Matric (codes 211, 219, 253, 254, 256 and 257) and FA courses (codes 313, 326, 327, 328 329, 342 and 349) to find out the total number of students who got enrolled and took the examination, in three semesters (a) Autumn-2013, (b) Spring-2014 and (c) Autumn-2014 respectively. The second objective was to find out the real quantum of work shouldered by this group and by individual Sub Examiner (S/E), thirteen (13) registered for paper evaluation, while a separate group ID was allotted to this team, supervised by one Head Examiner (H/E), supported by one Assistant. The results indicate that in Autumn-2013 this team evaluated 2340 papers/answer scripts contained in 09 bundles of six Matric courses in Spring-2014 a total of 4664 papers were contained in 13 bundles while in Autumn-2014 a total of 3137 papers evaluated contained in 15 bundles. Simultaneously the quantum for FA courses, evaluated was 7807, 8034 and 5829 contained in 35, 26 and 21 bundles respectively for these semesters. The cumulative picture of both Matric and FA courses, as revealed in each semester contained in 44, 39, 30 bundles was 10147, 12,698 and 13,313 papers in the three semesters, respectively. The paper also includes the remuneration of each S/E, the H/E and the Assistant for each semester, separately. The paper ends with the conclusion that the interest of Matric and FA students was increasing at AIOU, although Agriculture and Livestock courses are optional subjects, with recommendation.

Key words: Paper evaluation, Matric, FA course Agriculture Livestock, AIOU, Pakistan.

INTRODUCTION:

As per normal schedule, Allama Iqbal Open University (AIOU) offers different subject courses at Matric, FA, BA, MA, M.Sc(Hons)/M.Phil and Ph.D level, in addition to compulsory courses at Matric and FA in Agriculture and Livestock Sciences regularly offered as optional courses. These were Poultry Sciences-211, Agriculture Science-219 replaced by two courses Horticulture-257 and Agri. Crop Production-256 simultaneously Livestock Management Code-253 and Livestock Production Code-254 were newly introduced in 2013 onwards; at Matric level. The FA level courses being offered were Dairy Farming-313, Profitable Agriculture-326, Farm Machinery and Equipment-327, Oil Seed Crop-328, House Hold Agriculture-329, Gardening/Baghbani-342 and Plant Protection-349.

The Agriculture and Livestock Group of Paper Evaluation (ALGPE) were given the task by the H/E to make additional effort in presenting the comparative picture of three semesters, (data of paper evaluation) of Matric and FA courses for (a) Autumn-2013 (group ID-2279) (b) Spring-2014 (Group ID 2414) and (c) Autumn-2014 (Group ID-

2571). Since all the sub. Examiners (S/Es) being properly qualified, with their basic degrees of B.Sc (Hons) and/or DVM together with their M.Sc.(Hons)/M.Phil in Agriculture and/or Veterinary Sciences, (the required qualification for registration as S/Es), the team of authors took the responsibility for this task and this research paper is the outcome of this effort. The Head Examiner's (H/E)'s record was available for tabulation and summarized analysis.

Similar Efforts were also made in the years 2012 [1] and 2014 [2] which were published and received every appreciation, at AIOU, other Universalities, Research Institutions, fellow S/Es and H/Es of other subjects. Research fellows from our group also presented this work in their group assignments/course workshops of MA & M.Sc.(Hons) M.Phil-Agriculture as well as M.Phil (Science Education). The paper also includes the summarized remuneration(s) of each S/E, the Assistant and H/E for each semester, separately. The total remuneration/financial award, as per revised notification of Controller of Examinations, (CE), AIOU-2014 was Rs.1,52,608/- for Autumn-2013, Rs.1,95,101/- for Spring-2014 and Rs.1,68,662/- for Autumn-2014 Semesters. It is worth mentioning that a total of Rs.5,358, Rs.32,678 and Rs.16,867 was deducted as 10% income tax, in each semester, as revenue generation, for the nation, by this group.

This effort was made with the following of its objectives:

1. To find out the total number of enrolments and appeared in Examination in Matic & FA evaluation in three semesters.
2. To compare the quantum of work shouldered in paper evaluation for Autumn-2013, Spring-2014 and Autumn 2014 respectively.

MATERIAL AND METHODS:

The following documents were excessively consulted and material incorporated in this study:-

- (i) H/Es records of Matric & FA paper evaluation of (a) Autumn-2013 (b) Spring-2014 and (c) Autumn-2014.
- (ii) Remuneration details of H/E, the S/Es and Assistant for the three semesters under report.
- (iii) All official notification/circulars of (a) Controller of Examination (CE), AIOU (b) Federal Board of Intermediate and Secondary Education, Islamabad and (c) Rawalpindi Board notifications etc.

RESULTS:

Semester-wise paper evaluation results comprising quantum of work, in each course code of Matric and FA classes along-with remuneration of S/Es, H/E and Assistant is elaborated and all data supported with tables.

(a) Autumn Semester-2013

Matric Courses:

A total of 13 S/Es were directly involved in Agriculture and Livestock paper evaluations, supervised by one H/E and supported by one Assistant with Group ID-2279 completed 2340 answer scripts of Matric level spread over nine (09) bundles/bags (comprising course code-211, 253, 219, 254, 256 and 257 as presented in table No.01.

FA Courses:

Simultaneously, the same team of this group evaluated course codes 313, 326, 327, 328, 329, 342, 349 and 305 (Dehi Taraqi). The total quantum of FA papers evaluated was 7807 contained in 35 bundles/bags, as detailed in table No.01.

A cumulative target achieved was 10147 both for Matric (2340) and FA 7807. The maximum involvement of S/Es in this semester's work was by Iram Shahzadi (3343), followed by Shabnam Kayam (1365) Quratal Ain (1365) Dr. Khizar Hayat (1049), Bilal Mansoor (662), Ehtisham Raheem (659) Nasira Parkeen (456) Rabia Khurshid (455) and S. Tahir Hassnain (432). Rest of the S/Es evaluated less than 300, as presented in table No.02.

(b) Spring Semester-2014

Matric Courses.

In Spring-2014 the team with Group ID-2414 comprised 14 S/Es, supervised by the H/E and assisted by one support staff completed 4664 answer scripts (both Livestock and Agriculture codes) spread over 13 bundles/bags comprising 211(01), 253(01), 254(01), 256(03) and 257(07) containing 461, 317, 328, 1080 and 2478 answer scripts for each code as presented in table No.04.

The maximum turnover was by Shabnum Kayani (902) followed by Iram Shahzadi (816) Dr. Khizar Hayat (779), Saima Bibi (537), Kamran Khan (453) and Dr. Sajida (440) while rest of the S/Es work was less than 300, as per details available in table No.03.

FA Courses.

Simultaneously, immediate after completing Matric Course Codes, the paper evaluation started with FA courses. A total of 8034 answer scripts were evaluated by this team. The maximum time devoted to this task was by Iram Shahzadi who evaluated 1709 papers followed by Shabnum Kayani (1085), Dr. Sajida (962), Nasira Parveen (946), Saima bibi (899), Dr. Khizar Hayat (767) and Quratul Ain (578) while others were less than 300, as appears in table No.04.

On the whole the cumulative quantum of turnout was 12,698 answer scripts evaluated both for Matric (4664) and FA (8034), spread over 39 bundles/bags comprising Matric (13) and FA (26) detailed in table No.04.

(c) Autumn Semester-2014

Matric Courses:

The team of Agriculture and Livestock group, with ID No.2571 comprising 12 S/Es, supervised by the H/E with support of one Assistant completed 4137 answer scripts evaluation work spread over 15 bundles/bags comprising codes 211 (01), 253(01), 254(02), 256 (03) and 257(07) with 373, 341, 420, 821 and 2182 papers respectively as presented in table No.05.

FA Courses.

Simultaneously, immediate after completion of Matric courses, FA course codes started pouring in the Secrecy Section. A total of 5898 answer scripts were evaluated spread over 22 bundles/bags comprising course codes 313(02), 326(04), 327(03), 328(03), 329(05), 342(02) and 349(02) while one bundle/bag pertained to code 484(01). BA; containing 317 papers in these bundles respectively. Cumulatively a total of 13045 answer scripts were evaluated out of 37 bundles/bags in both Matric (15 bundles comprising 4137) and FA 21 bundles/bags comprising 5998 papers as well as one bundle/bag of BA Code-A 484 with 317 scripts, as appears in table No.05, No.06 and No.07 respectively. When self marking of 23 scripts are added to 4137 these become 4160 hence the total number of scripts become 10313, as presented in table No.12, summarized picture.

CONCLUSIONS:

To conclude although the agriculture and livestock course are not compulsory courses, like English, Maths, Islamyat and Pak. Studies, the interest of students for enrolment of these courses is increasing both in Matric as well as FA level, as seen in three semesters under report.

RECOMMENDATIONS:

1. As AIOU have introduced two new course at Matric level namely Basic Livestock Management-253 and Livestock Production 254 the students have started enrolling these courses since 2013 which is encouraging.
2. Similarly two new course in Agriculture at Matric level namely crop production-256 and Horticulture-257 have captured the attention and interest of new students for enrolment. This consistent increase in enrolment supports the work done by Committee of Courses (CoC) and Faculty Board Meeting of DAS with a positive approach and is appreciated.
3. Still new courses very relevant to Livestock and Agriculture may also be introduced in the coming years.

The remunerations of Matric and FA Script evaluation is still for less than the FBISE, Islamabad and Rawalpindi Board which need to be enhanced to Rs.20/- for Matric, Rs.25/- for FA per script while BA & B.Ed. must be raised to Rs.30/- per script.

REFERENCE:

- Controller of Examinations (2014). Enhancement of rates of evaluation remuneration for H/Es, S/Es and Assistants to H/Es for different categories of classes (Matric, FA, BA/B.Ed, M.A/M.Sc., M.Phil and Ph.D) at AIOU, Islamabad, official Notification.
- Controller of Examination (2013-14) Criteria for Sub-Examiners Registration, their qualification and attestation of their degrees from Higher Education Commission (HEC), Islamabad.
- Khizar Hayat, Muhammad Hafeez, Shabnum Kayani and Quratul-Ain (2014). The increasing enrolment of agriculture and livestock subjects at Matric and FA level at AIOU. Paper evaluation comparison of two semesters in 2013. Pak.JLSc. Vol-VI, No.06-2014, pages 401-409.
- Muhammad Hafeez, Tabinda Khawaj, Fahad Karim, Bilal Mansoor, M. Ibrahim and Iram Shahzadi (2012). Increasing Trend of Enrolment of Matric and FA students in Agriculture and Livestock at AIOU, Islamabad Pak.JLSc. Vol-IV, No04 pages 255-264.

Table No.01 showing the Quantum of paper evaluation work performed by the Agriculture and Livestock Group No.2279, for Autumn-013, at AIOU, Islamabad (work done in June and July-2014)

Sr.#	Matric Courses	Bundle/ Total	Sr.#	FA Courses	Bundle/ Total
01	Agriculture	219/01=229	01	Dairy Farming	313/06=1110
02	Poultry Sciences	211/02=413	02	Agriculture	326/05=1079
03	Livestock management	253/01	03	Farm Machinery	327/03=809
04	Livestock Production	254/01=238	04	Oil Seed Crops	328/05=1036
05	Agriculture	256/03=881	05	Agriculture	329/04=970
06	Horticulture	257/02=579	06	Horticulture	342/04=970
			07	Plant Protection	349/05=1277
			08	Dehi Taraqi	305/04=1059 05/7807

Source: H/E's record for Autumn-2013, Group-2279

Table No.02 showing individual examiners performance in Autumn-2013 (Group No.2279) Paper evaluation at AIOU, Islamabad with remuneration.

Sr.#	Name of Examiner	Scripts	Grass claim	Tax 10%	Net claim
01	Dr. Khizar Hayat	1049	45191	2710	42481
02	Iram Shahzadi	3343	12422	745	11677
03	Bilal Mansoor	662	9103	547	8556
04	Shabnam Kayanl	1365	18726	1123	17603
05	Quratul-Ain	1154	15018	901	14117
06	Nasira Perveez	456	6113	366	5746
07	Kamran Khan	217	3615	217	3398
08	Rabia Khursheed	455	6305	378	5927
09	Ehtsham	659	8086	485	7601
10	M. Ibrahim	27	3055	183	2872
11	Sumera Saeed	186	2983	179	2804
12	S. Tahir Hasnain	432	5945	356	5589
13	M. Shahid	96	1351	81	1270
14	Dr. M. Hafeez (H/E)	16 test copies and 11% of the bundle			
15	Zahida Zoor (Asstt)	10147	15451	927	14529
Total Claim			1,57,966	5358	1,52,608

Source: H/E's record of paper evaluation.

Table No.03 showing the quantum of work (paper evaluation) Matric and FA courses in the disciplines of Agriculture and Livestock Group No.2414 at AIOU, Spring-2014 (work done in Dec-014 and Jan:2015)

Sr.#	Course code with Bundle	Matric	FA	Total Scripts Evaluated
01	211/01-01	461	..	461
02	253/01-01	317	..	317
03	254/01-01	328	..	328
04	256(1+2+3)-03	1080	..	1080
05	257(1+2+3+4+5+6+8)-13	2478	..	2478
		4664		
06	313(1+2+3+4)-04	..	1306	1306
07	326(1+2+3)-03	..	965	965
08	327(1+2+3+4)-04	..	1236	1236
09	328(1+2+3)-03	..	800	800
10	329(1+2+3+4)-04	..	1187	1187
11	342(1+2+3)-03	..	940	940
12	349(1+2)-02	..	684	684
13	305(1+2+3)-03	..	916	916
	Total	4664	8034	8034

Source: H/Es record of paper evaluation, AIOU, Islamabad

Table No.04 showing the remunerations of paper evaluation work of Agriculture and Livestock Group No.2414, Spring-2014, AIOU, Islamabad (work done in December - 2014 and January-2015)

Sr.#	Name of Examiner	Regd No.	Total paper evaluated	Gross claim (Rs.)	Income Tax @ 10%	Net Claim
01	Dr.M. Hafeez (H/E)	0413	1553	23512	2351	21160
02	Dr.Khizar Hayat (S/E)	0496	564	7736	774	6962
03	Iram Shahzadi (S/E)	0379	2622	35839	3584	32255
04	Muhammad Ibrahim (S/E)	0456	344	4660	466	4194
05	Saima Bibi (S/E)	2305	429	5577	558	5019
06	Rabia Khurshid (S/E)	0485	100	1300	130	1170
07	Qurat-ul-Ain (S/E)	2053	886	11997	1200	10797
08	Shabnam Kayani (S/E)	2080	795	10494	1050	9444
09	Bilal Mansoor (S/E)	1492	576	8251	825	7425
10	Memona Khan (S/E)	414	1380	18685	1869	16816
11	Rafia Nimal (S/E)	2296	321	4274	427	3846
12	Bushra Tabassum (S/E)	2575	1370	19004	1900	17104
13	Najeeb Ullah (S/E)	2593	149	2086	209	1877
14	Zahida Zahoor (Asstt. To H/E)	288	9436	14154	1415	12738
	Total Claim			167569	16758	150807

Source: H/Es paper evaluation record of Spring-2014 Semester, AIOU, Islamabad

Table No.05 showing the total number of answer scripts of various course codes of Matric and FA.

Sr.#	Matric Course Codes	Bundle	Total Scripts	FA Codes	Bundle	Total Script	
01	Poultry Sc. 211	01	373	313	02	650	
02	Livestock Management 253	02	341	326	04	932	
03	Livestock Production 254	02	320	327	03	752	
04	Agriculture 256	03	821	328	03	759	
05	Fruit Production 257	07	2182	329	05	1186	
Total		15	..	342	02	595	
				349	02	645	
i	Self Marking	23					
ii	Food Nutrition 484	01	317		21	5879	
iii	Course Codes Bundles	15+21+01=37					10356
iv	Total Scripts Evaluation	4160+5879+317					

Source: H/Es record of Autumn-Semester-2014

Table No.06 showing remuneration of H/E, S/Es and Asstt. for the paper evaluation done in Autumn-2014 (as per AIOU rates) for the period July-August-2015

Sr. #	Name of Examiner	Paper Matric	Evaluated Amount	FA	Amount		Tax	Net Rs.
01	Dr. M. Hafeez (H/E)	4106	..	5892	..	..	..	..
02	Dr. Khizar Hayat	135	1755	511	7154	8918	891	8018
03	Najeeb Ullah	..	..	209	2926	2926	293	2633
04	Iram Shahzadi	1288	16744	1613	22582	45266	4527	40739
05	Bilal Mansoor	51	663	198				
06	Saima Bibi	399	5187	..	..	5187	519	4668
07	Memona Khan	621	8073	716	10024	18097	180	16287
08	M. Ibrahim	145	1885	233	3262	5147	515	4632
09	Quratul-Ain	391	5083	499	6986	12069	1207	10862
10	Shabnam	600	7800	159	2226	10026	1003	9023
11	Bushra Tabassum	156	2028	1246	17444	19472	1947	17525
12	Rafia Nimal	220	2860	125	1750	4610	461	4149
13	Rabia Khurshid	90	1170	..	..	1170	117	1053
14	Kamran Khan	10	130	..	..	130	13	117
15	Zahida Zoor	4106	..	5879	10302	15453	1545	13908

Source: Agriculture and Livestock group No.2571.

Table No.07 showing the summarized comparative distribution of total answer scripts evaluated for Autumn-2013 Spring-2014 and Autumn-2014 Semester by Agriculture and Livestock Group at AIU, Islamabad.

A	Matric Course Code	Autumn 2013 G-2279		Spring-2014 G-2414		Autumn -2014 G-2571	
		Bundles	Scripts	Bundles	Scripts	Bundles	Scripts
i	211	02	413	01	046	01	373
ii	219	01	229	..	..	..	..
iii	253	..	..	01	317	02	341
iv	254	01	238	01	328	02	420
v	256	03	881	03	1080	03	821
vi	257	02	579	07	2478	07	2182 + 23
Total		09	2340	13	4664	15	4137
B	FA Course Code	Autumn 2013 G-2279		Spring-2014 G-2414		Autumn -2014 G-2571	
		Bundles	Scripts	Bundles	Scripts	Bundles	Scripts
i	313	06	1110	04	1306	02	650
ii	326	05	1079	03	965	04	932
iii	327	03	809	04	1236	03	750
iv	328	05	1036	03	800	03	759
v	329	03	467	04	1187	05	1186
vi	342	04	970	03	940	02	595
vii	349	05	1277	02	684	02	645
viii	305	04	1059	03	916	..	..
		35	7807	26	8034	21	5879
C	BA	Average	223	..	309	..	279.9
Food and Nutrition 484		..	..	..	..	01	317
Grand Total		44	10147	39	12698	37	10363

Source: HE's record of Agriculture and Livestock group, AIU, Islamabad

BOOK REVIEW: CRITICAL EVALUATION OF TRAINING MANUAL FOR ANIMAL HEALTH AND PRODUCTION WORKERS-2015

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ABSTRACT

The training manual for Animal Health and Production Workers (AHPWs) comprising 27 different topics, spread over 97 pages, written in Urdu, for farmers and trainees is a second edition of the same topic earlier written in 2006. The topics and lectures of this manual include introduction, establishing an Animal Health and Production Centre (AHPC) with AHP kit, various endemic clinical/non infections and infections animal disease including miscellaneous ones. The manual also describes morbid material to be sent to laboratory diagnosis, increasing productivity of domestic animals and an agreement between AHPWs and the NGO, Livestock Development Foundation (LDF), under trainings program, sponsored by funding agencies, for running the centre independently. The manual also includes the provisional estimates for establishing of broiler and layer farm, sheep/goat farm and a dairy farm. The manual also puts forward the training schedule, the record keeping in an AHP centre, necessary equipment urgently needed veterinary medicines and vaccines for use in the farmer's livestock and poultry with income generation. The author has brought recent data, fresh market rates and necessary guide lines to convince the trainees for establishing their own livestock/ sheep goats and poultry farms for self reliance and poverty reduction, lastly the manual is supported with feasibilities for bank loans, as financial assistance/credit/loan for these economic activities.

Keywords: Animal Health and Production – Training Manual Livestock, Pakistan.

INTRODUCTION:

This booklet written, in Urdu comprising 27 different topics and spread over 97 pages, is a Training Manual (TM) prepared for Livestock Farmers, named as Animal Health and Production Workers (AHPWs). The concept of AHPWs both male and women workers was put forward in 2003-04 when the European Union (EU) assisted strengthening of Livestock Services Project (SLSP) was implemented in selected Districts of Pakistan [1]. In this project, Community Livestock Extension Workers (CLEWs) and Women Livestock Extension Worker (CWLEWs) were trained for a period of 10 days using such training manuals, as an instrument. Since the author, Dr. Muhammad Hafeez, was practically involved as project initiator in 2000-2001 and the project was practically operational, after its approval from Ministries, Planning Commission and Executive Committee of national Economic Council (ECNEC) in 2002-03, the author went for his retirement and joined as Director, Livestock Development Foundation (LDF), a registered NGO at Islamabad.

The first edition of this Training Manual (TM-I), written in 2006 was a requirement for organizing farmer's training and was best utilized in Peshawar, Abbotabad Cattle Breeding and Dairy Farm (CBDF) Hari-Chand Charasadda, Lahore and in Sindh [2]. The NRSP officers also used that TM-I, in different Training Programs.

That earlier Training Manual (TM-I) was registered in the National Library of Pakistan, Islamabad for ISBN-978-969-9219-09, and TM was successfully used in farmers trainings in 2010 and 2011 under LDF-PARC-ALP project No.AS-137 (2010-1) in two different trainings at Tando-Allahyar, Sindh. That training manual was appreciated by Director, Livestock & Dairy Development (DL&DD) Sindh, as well as teaching staff in the faculty of Animal Husbandry and Veterinary Sciences, Sindh Agriculture University (SAU), Tando Jam, equally appreciated by Sindh farmers with the result that the TM-I was translated by a learned teacher Dr. Javed Gadahi of SAU, Tandojam in Sindhi Language [3] and was best being utilized until 2013-14. The author says that there was a demand of updating TM-I to the fresh one, in hand, with updates of technical and commercial market rates and specially the Rural Development Workers (RDWs) who were using the Training Manual for RD workers written by the author [4] namely "Participatory Training Manual for RDWs in Urdu in 2012, as well as various trainers of different NGOs in Sindh requested the author for updating TM-I in the present on TM-II (2015) under review.

MATERIAL AND METHODS:

The following documents were excursively examined, in addition to the references of this TM-II.

- i. Strengthening Livestock Services Project (SLSP) 2006-09 MINFAL, GOP, Islamabad.
- ii. Final completion Report of SLSP-2010.
- iii. Animal Health and production Workers (AHPWs) Training Manual (TM-I) – 2006.
- iv. Animal health and production Workers (AHPWs) Training Manual – Sindhi Language (TM-S) 2010.
- v. Training Reports of SLSP-Sponsored AHPW's Training Programs, Peshawar and Abottabad (2008).
- vi. Farmer's Training Reports of LDF-PARC-ALP- Project No.AS-137 2010 and 2011, Tando Allahyar, Sindh.

CRITICAL REVIEW:

The present AHPW's TM-II, in hand was critically examined for its contents, the material presented inside, the level for the write up and the actual technical requirements of this manual, at par with the farmers capability, for learning (who may or may not be Matric or under Matric by academic qualification).

The content wise/chapter or lecture wise frank but critical re-dressal review is laid down as under:-

1. Lecture one, comprising four (01-04) pages is a brief introduction to Animal Health and production Workers (AHPWs) training course in which the background of writing this Training Manual (TM) and importance has been laid down which is quite understood. The objectives of which have been narrated. Summarizing the outlines each important component (which will be discussed later) has been briefed.
2. Lecturer two, spread over four (5-8) pages, provides itemized detail of an AHP-Kit, used in the proposed animal Health and Production Centre (AHPC) comprised 42-45 items which have now been increased to 63 items. These are essential in running a clinical AHP centre. The trained farmers/workers can best utilize these, when needed. The functions and uses of these items have been described in a simple way of understanding.
3. The third lecturer, spread over four (08-11) pages, provides salient points of establishing an AHPC, very much needed in a village where Veterinary Dispensary (VD), Veterinary Centre (VC) or a small Veterinary Hospital (VH) is kilometers away. This proposed centre is run by the local farmers community, on self help basis and on monthly contribution of membership, nominal fee of registration of large animals (cows and buffaloes) including sheep and goats. The funding agencies support such activities in Livestock health and Production. The income generation component of this proposed centre is a rewarding effort and running the AHPC, on sustainable basis.
4. Lecturer four, spread over five pages (12-16), provides urgently needed veterinary vaccines, for protecting large and small ruminants against infectious diseases. This lecture also includes vaccines needed in poultry production (both broilers and layers).
5. Lecturer five, spread over three pages (17-19) provides clinical non-infectious disease of Dairy Animals. The author has just enumerated these but split into various systems of the body such as respiratory, digestive Uro-genital, Blood circulatory, brain and nervous system including milk system and skin diseases.
- 6-7. Lecturer six and seven, spread over four pages (20-23) provides annotated, itemized names of four categories of infectious diseases of livestock broadly

- (i) Bacterial (ii) Viral (iii) Parasitic and (iv) Miscellaneous. The diseases included are mainly the endemic (found in most parts of the country) and other surrounding countries of the region.
8. Lecture eight, spread over only one page (24) describes the morbid material to be dispatched for laboratory diagnosis. This comprises sputum, urine, blood (with anticoagulant) and blood slides, serum, faces, skin scrapings, semen and tissues for various diseases.
 9. Lecture nine, spread over six pages (25-30) describes the production performance which is sub-divided into (i) increase in milk production (ii) good breed (iii) feed management and (iv) animal health care, together with prophylactic vaccination of animal against prevalent diseases of this area. This lecture also includes increased beef production for which breeds of cattle both local and exotic along-with their care and management supported with dietary plan of feed and feeding has been written for trainee farmers.
 10. Lecture ten, spread over four pages (31-34), is a concise, brief but comprehensive approach for poultry farming although it is a short account of various steps in poultry farming but step by step itemized narration is available both in Urdu and equivalent vernaculars in English. We can count these on finger tips starting with land, road link, poultry shed with housing space, feeding and watering, utensils, water availability, brooders, care and management and poultry health care schedule etc etc.
 11. Lecture eleven, spread over three pages (35-37), is a sample agreement between the trainee farmers, the AHP worker (on stamp paper) who will establish the AHPC in his premises, with the NGO taking/providing grant assistance to the local farmers community and that the NGO concerned will help assist the community in organizing such training and running the centre, cordially.
 12. This lecture twelve, spread over (4 and half) page (38-42) describes the practical implementation of all record, of the centre, the record keeping. This record is comprises 10 items hard registers describing each as (i) inventory (ii) personnel (iii) drugs and vaccines, (iv) animal registration (v) farmers registration (vi) fodder seed distribution (vii) folder production and sale (viii) vaccination record on different proformas (ix) sale of veterinary drugs and (x)

cash book along-with opening of bank account for keeping had cash, including milk production and poultry record.

13. Lecture thirteen, spread over five and half pages (42-47) pertain to sheep and goat farming starting with population, mutton produced, principles of farming, housing requirements, animal health care (medication and prophylactic vaccination against endemic diseases etc.) and various sheep and goats breeds of the country have been included. This lecture material also includes economic ration formulation for feeding sheep and goats, in addition to green fodder, which stand equally good in all seasons.
14. Lecture fourteen, spread over six pages (48-53), describes the proposed estimated income from an AHPC, so established. The income generation has been indicated from the membership contribution of farmers, registration of large and small ruminants, saving from veterinary medicines and vaccines including fodder grown by the farmers and its share to the centre. Similarly second year's income has also been estimated, and the centre is proposed to be running on self reliance on sustainable basis, if funded one time. Still in the same lecture small scale business have been proposed such as fast food, including, jam jelly, squashes preservation of fruits and vegetables and others etc.
15. Lectures fifteen spread over four pages (54-58) describes the production for broilers upto six week for poultry meat purposes. All steps have been jotted down comprising day old chicks, care and management of chicks and growing upto day 42/45, supporting with complete feeding plan as well as poultry health care schedule and marketing.
16. Lecture sixteen, spread over only three pages (59-61) is a brief account of a proposed estimate of production of 3000 and 6000 broilers, with itemized costs of poultry shed equipment, cost of day old chicks, feed, medicines and vaccines along-with other miscellaneous expenditure and sale income of birds in the market.
- 17-18. Lecture, seventeen/eighteen, spread over five pages (62-66), describes the production of layers, keeping upto 1-½ years egg production and lastly sale, of layer birds. This lecture material is supported with care and management details, feeding and poultry health care schedule from 1st week to the age of egg production and thereafter including additional poultry vaccines the second

part of this lecture, is spread over eight pages (67-74), is an expenditure estimate, an income generation commercial until of 3000 and 6000 layers poultry farms. This plan is for 1-½ years (some times more). The trainee workers (AHPWs) and farmers who underwent last training in 2006, 2008 and 2010, 2011 demanded to the author for putting this material in TM-II (in hand) and has positive response of trainers as well. The financial summary at the end of this lecture indicates that this type of farming thought laborious, painstaking hard work but is profitable.

19-20. Lecture nineteen and twenty, spread over six pages (75-80), describes a brief feasibility of an economical dairy farm. Starting with importance, milk prices, milch animals, housing and equipments, manpower, fee and fodder, livestock management and production activities including animal health care system has been categorically stated. The income and expenditure is said to be worked out in the class.

21-27. the last seven lectures, spread over fifteen pages (81-95) and each lecture pertain to a different list of items, namely (i) AHP training schedule, (ii) list of AHP – kit, (iii) necessary veterinary medicines (iv) essential veterinary vaccines (v) income generation proposed and (vi) different proformas for record keeping as well as an agreement (English draft) between the NGO, coordinating to establishing AHPC with the local farmer community for running the AHPC on sustainable basis. The training manual is supported with references at the end of this booklet, specially the references on livestock and rural development.

FRANK AND CRITICAL OBSERVATION:

1. The training manual is indeed a good effort.
2. Resource persons, for teaching various lectures may also include teachers from veterinary university and livestock departments, closely available.
3. Since it is farmer oriented training manual it must be supported with photographs (preferably colored once) to differentiate various breeds of cattle, buffaloes sheep and goats including poultry.
4. Diagrams or photos of sheds and shed equipments are also indicative to be added.
5. The author is requested for strict editing.

REFERENCES:

- Andrew Shepherd (2000), Sustainable rural Development, Text Book for Rural Development, AIOU Book Series (NBF), Islamabad.
- John. W. Cusworth and tom R Franks Developing Countries Code 1796, AIOU Book Series.
- Sophio Laws, Caroline Harper and Rachel Marcus (2000) Research for Development National Book Foundation, Islamabad
- T.V. RAO (2000) Human Resources Development Code-1973 AIOU-511, National Book Foundation, Islamabad.
- Executive Director (2009) SLSP-Final Report, Islamabad.
- Ejaz Wasti (2010) (2011), Pak. Economic Survey Social & Rural Development in Pakistan.
- Executive Director (2008-09) Annual Report of NRSP, Islamabad.
- Ejaz Wasti (2009-10); Pak. Economic Survey (2009-10), Economic Advisory Research (2010-11), Q-Block, Islamabad.
- Executive Director (2009-10) Trust for Voluntary Organization Annual Report (2009-10) Islamabad.
- Editors and Writers (2007-08), Rural Development Code 305, AIOU Books Series, Islamabad.
- Editors (2000), Forestry & Rural Development Courses Book for M.Sc. Forestry Class, AIOU Book Series.
- Editor (2001) Forestry & Afforestation (2001) AIOU Book Series, Islamabad.
- Muhammad Hafeez (2011), Livestock & Rural Development Livestock Industry, HEC Publication.

EFFECTIVENESS OF COOPERATIVE LEARNING IN CHEMISTRY AT SECONDARY LEVEL

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ABSTRACT

Cooperative learning is a learning technique in which the learners achieve their learning goals by helping one another, in a special social setting. This study was conducted to evaluate the effectiveness of cooperative learning method, using Students Teams Achievement Divisions (STAD), in the subject of Chemistry at secondary level. Pre-test and post-test equivalent group experimental design was used in this study. The sample size was sixty four. Treatment of planned cooperative learning method of STAD was implemented to experimental groups. Student's academic achievement was measured through achievement test. Cooperative learning rubric was used to assess the extent of cooperative behavior in experimental group. Student's attitude regarding cooperative learning was also measured through attitude scale. Significant difference was found between the scores of two groups. Data analysis revealed that the experimental group outscored significantly over the control group on post-test result.

Keywords: Cooperative Learning, Competition, Academic Achievement, STAD.

INTRODUCTION:

Significant economic and social differences exist between the developed and developing countries. The most crucial causes of social and economic disparities are the differences in the popularization of science and technology including scientific infrastructure, in these two groups of countries. An essential prerequisite to a nation's scientific and technological progress heavily relies upon its emphasis on a good science education system. This is one of the key factors that contribute to a nation's socio-economic development. Education is a two way communication process during teaching learning. Learning depends upon instructions and interactions among the learners. A teacher must think of ways and means of encouraging and stimulating the students during their learning in the class room. Teacher should enhance the interest of students and motivate them to learn. Researches on cooperative learning revealed that peer interaction is essential for successful cooperative learning, as closely linked to cognition. Researchers have also proved that cooperative learning methods are helpful in cognitive restructuring and increased understanding of students. Apart from academic benefits, cooperative learning has been found to promote self-esteem, interpersonal relationship and improved attitudes toward school and peers (Johnson & Johnson, 1998).

In Pakistan, traditional teaching method is used in most of the schools. As the

traditional teaching method is teacher centered, therefore there are certain limitations to motivate the students. With the use of traditional learning methods it is not possible to provide individual attention to all the learners. As a result the gap between weak and brilliant students begins to increase. Individual differences are major barriers in the teaching and learning process, in a traditional classroom. Cooperative learning may help the teachers and the learners by utilizing the energies of the able, active and high achievers in the class in helping their classmates to enhance the overall academic achievements.

Traditional teaching methods cannot actively engage majority of the students. With the help of student centered approaches, students can be actively engaged in teaching learning process. Synergy of the whole class may be used for the better output in the form of better academic achievement. According to National Educational Policy (NEP) (2009), a child should be treated as the center of learning process. The NEP also encourages active learning, critical thinking, creativity, and peer group discussions. Therefore, this study was designed to evaluate the effectiveness of cooperative learning in the chemistry class at secondary level.

BRIEF REVIEW OF LITERATURE:

The roots of cooperative learning are found in learning theories. Due to new exploration of the learning process, most of the development work on cooperative learning has been done during last thirty years of the 20th century. Cooperative learning is a teaching and learning method of constructivism theory. Johnson and Johnson (1999) stated that social cohesion and interdependence perspectives, cognitive perspectives and motivational perspectives support the cooperative learning. There are many methods of cooperative learning i.e Student Teams Achievement Divisions (STAD), Team Game Tournaments (TGT) and Jigsaw II.

Chim (2015) revealed that studies conducted on cooperative learning rarely used interventions. Achor and Musa (2014) found significant difference between the mean scores of student's achievement when taught through lecture and cooperative learning strategies; STAD was found to be better than Jigsaw strategy. The researchers recommended STAD and Jigsaw learning strategies facilitated learning of biology in secondary schools in the study area. However, STAD was found to facilitate learning more than Jigsaw.

Tiantong and Teemuangsai (2013) reported that learning achievement of the

pretest scores were found to be significantly different from the post test, and concluded that the technique can be applied through the Module to enhance learning achievement on computer programming course successfully. Nwosu (2014) found that STAD cooperative instructional strategy resulted in better performance of learners in science than traditional teaching method. In addition, learners expressed an increased interest, motivation and self-efficacy after exposure to cooperative learning.

Van Wyk (2012) compared to direct instruction, STAD helped to promote positive attitudes, yield better achievements and motivated students to learn in economics education. However, Khan and Inamullah (2010) found no significant difference between the academic achievement of control group and experimental group. Njoroge and Githua (2012) conducted research in mathematical teaching and learning using cooperative learning model. The results indicated that there were no gender differences in student's mathematics achievement after their being taught scale drawing topic through STAD, co-operative learning strategy. It was recommended that STAD co-operative learning strategy must be included in the syllabus for pre-service and in-service teacher education programs and be used by mathematics teachers during instruction.

Gubbad (2010) conducted a study to find the effect of cooperative learning achievement and long retention in the mathematical subject at the primary school level in Saudi Arabia. The results showed the superiority of cooperative learning for higher academic achievement and longer retention of the students. Zakaria, Chin, and Daud (2010) stated that positive changes will take place when a Researcher will change his/her teaching method towards a more learners-centered approach.

MATERIAL AND METHODS:

According to Federal Directorate of Education, there were 97 schools, at secondary level in Islamabad Capital Territory (ICT). All the students studying chemistry at secondary level in Islamabad city were considered the population of this study. Formal approval was sought from the Principals to conduct this research. It was ensured that the cooperative learning method will not harm any student emotionally, physically or mentally. Sixty four (64) students of 9th grade were selected at random from four sections of IMCB (IV-X) G-8/4. Two equivalent groups were formed and there were 32 students in each group. The age of the learners ranged from fourteen to fifteen

years approximately.

An achievement test consisting of 30 multiple choice questions (MCQs) was used as pre-test and post- test. The reliability for the whole test was 0.63. This coefficient confirmed high reliability. Content, face and construct validities of the test were also checked and improved by the different experts. There were fifteen items selected from chemistry text book chapter 2, (structure of atoms) and fifteen items from chapter 3 (periodic tables and periodicity of properties)

The experimental group was taught by cooperative learning method STAD whereas the control group was taught by lecture method. Lesson plans were based on the same instructional objectives but the plan made for the experimental group provided the opportunities for the team members of experimental group to cooperate with one another. The cooperative learning methods comprised of six major parts: preparation, presentation, practices in teams, quizzes, individual improvement scores and team recognition.

RESULTS:

To check the hypotheses, the data was analyzed with the help of statistical Mean, Standard deviation and differences of statistical means for each group. The significance of the difference between the statistical means of the two groups was measured at 0.05% level of significance. T-test was applied and the results of various types of pre-tests, and post-test on experimental and control groups have been presented tables below:

Table 1 indicates the mean score of experimental group as 8.61 and that of the control group as 8.65 on pre-test. The calculated value of t (0.057) was smaller than tabulated value (2.0) at 0.05 level of significance. Therefore null Hypothesis H_{01} that there is no difference between mean scores of pretest of experimental group and control group was accepted. Hence, both the groups were declared to be nearly equal.

Table 2 depicts the calculated value of t (2.11) was greater than table value (2.0) at $p=0.05$ significance of level. Hence, H_{02} that there is no significant difference between mean scores of experimental group and control group on post-test was rejected and alternate hypothesis (H_a) that there is significant difference between mean scores of experimental group and Control group on post-test was accepted.

Table 3 shows the calculated value of t (4.58) was greater than tabulated value

(2.03) at $p=0.05$ significance of level. Hence, H_{03} was rejected i.e. there is no difference between means scores of pre test and post test. Hence alternate hypothesis (H_a) was accepted.

Table 4 shows that the calculated value of t (7.73) was greater than table value (2.04) at 0.05 significant level. Hence, H_{04} that there is no significant difference between the mean scores of experimental group in pre-test and post-test was rejected and H_a that was there insignificant difference between the mean scores of experimental group in pre-test and post-test was accepted.

Table 5 shows that total agreed responses were about 90%. Only 6.6% responses were uncertain and 3.3% were showing disagreement about cooperative learning so it is evident from the table 5 that cooperative learning method was liked by majority of the students hence the H_{05} that attitude of students towards cooperative learning will increase was rejected and H_a was accepted.

DISCUSSION:

First objective was to compare the performance of control group and experimental group in pre-test and post-test. It was found that there was no difference in the performance of the both groups in pre-test. However, data analysis showed that there was significant difference between mean scores of experimental group and control group in post-test. Hence the first objective of the study was achieved. Findings of the study confirmed the results of the experimental study of Stauffer (2013) and Guli & Shehzad (2015).

Relatively poor results of control group were due to the following reasons:

In traditional learning method, there was no interaction among the students. Students were not actively involved in teaching learning process and they did not share their knowledge. Such a method encouraged rote learning and memorizing.

The second objective of the study was to find out the attitude of the experimental group towards cooperative learning. The data analysis revealed that student's engagement was increased due to cooperative learning and the experimental group showed favorable attitude towards cooperative learning so second objective was also achieved. This finding is in line with the findings of Herrmann (2013) and Farzaneh (2014) as the researchers showed that cooperative learning method was liked by majority of the students. Total agreed responses were about 90% while 6.6% responses

were uncertain and 3.3% were showing disagreement about cooperative learning.

CONCLUSION:

The following conclusions were made on the bases of the data of this study:

1. Cooperative learning was significantly effective in teaching learning of chemistry at secondary level.
2. Learners of cooperative groups showed better performance in learning than learners of traditional environment.
3. The pedagogical use of findings showed that cooperative learning method engaged learners in useful interactions which was conducive for active learning.
4. It was found that every student not only maximized his learning but also increased the others' learning. There were many opportunities for communication in cooperative learning classrooms as compared to the traditional classrooms.
5. The results of the study proved that cooperative learning method was useful to improve the academic achievement of low achievers, and the average students.

RECOMMENDATIONS:

1. The study proved that cooperative learning was better for chemistry subject than traditional teaching learning method. Hence teachers, educators, and instructors should use cooperative learning to improve the academic achievement of the student in secondary classes.
2. Science teachers may be encouraged to implement cooperative learning in the classrooms in teaching science subject like chemistry. In this regard teacher training should be arranged for the use of basic elements of cooperative learning.
3. Heterogeneous groups were better for cooperative learning environment so teachers should use mixed ability groups for better output. Training should be provided in refresher courses for in-service teachers for the fruitful implementation of cooperative learning methods.
4. The teacher should ensure equal contribution of every individual in an activity during learning. If the assignment and activities are not constructed properly some members of the cooperative learning group may remain free rider.
5. The study determined only the academic achievement in chemistry at secondary level. Further studies may be conducted to examine the effectiveness of cooperative learning for different variables, like attitude towards science subjects, peer relation, social skills and academic motivation. It may become a wide field of research if we determine relative effect of different cooperative learning techniques and methods.

REFERENCES:

- Achor, E. E. and W. H. Musa (2014). Looking for a More Facilitative Cooperative Learning Strategy for Biology: Students' Team Achievement Division or Jigsaw? *British Journal of Education, Society&BehaviouralScience*4(12): 1664-1675.
- Chim, H. (2015). Literature Review of the Cooperative Learning Strategy–Student Team Achievement Division (STAD). *International Journal of Education*7(1): p29-p43.
- Farzaneh, N. and D. Nejadansari (2014). "Students' Attitude towards Using Cooperative Learning for Teaching Reading Comprehension. *Theory and Practice in Language Studies*4(2): 287-292.
- Government of Pakistan. (2009). National Education Policy (2009-2010). Ministry of Education, GoP, Islamabad.
- Gubbad, A. A. M. A. (2010). The Effect of Cooperative Learning on the Academic Achievement and Retention of the Mathematics Concepts at the Primary School in Holy Makkah. Makkah: Dept. Of Curricula & Instruction, Teachers College, Umm Al-Qura University.
- Gull F., Shehzad S. (2015). Effects of Cooperative Learning on Students' Academic Achievement. *Journal of Education and Learning*. Vol. 9(3) pp. 246-255.
- Herrmann, K. J. (2013). "The impact of cooperative learning on student engagement: Results from an intervention. *Active Learning in Higher Education*14(3): 175-187.
- Johnson, D.W & Johnson, R.T. (1999). *Learning Together and Alone: Cooperative, competitive and individualistic learning*. USA: Allyn and Bacon.
- Johnson, D.W., Johnson, R. K., & Holubec, E. J. (1998). *Cooperation in the classroom*. Dina, Minnesata, USA: Interaction Book Company.
- Khan, G. N. and H. M. Inamullah (2010). Effect of student's team achievement division (STAD) on academic achievement of students. *Asian Social Science*7(12): p211.
- Njoroje, J. N. and B. N. Githua (2013). Effects of cooperative learning/teaching strategy on learners mathematics achievement by gender. *Asian Journal of Social Sciences & Humanities*, 2 (2) 567-576.
- Nwosu, C. M. (2013). The impact of cooperative instructional strategy on the performance of grade 09 learners in science. (Master's Thesis) University of South Africa.
- Stauffer, W. (2013). *The Effects of Cooperative Learning on the Academic Achievement, Social Interaction, Behavior, and Affect of Secondary English and Social Studies Students*, The Evergreen State College.
- Tiantong, M. and S. Teemuangsai (2013). Student team achievement divisions (STAD) technique through the moodle to enhance learning achievement. *International Education Studies*6(4): p85.
- Van Wyk, M. M. (2012). The Effects of the STAD-Cooperative Learning Method on student achievement, attitude and motivation in economics education. *J SocSci*33(2): 261-270.
- Zakaria, E, Chin, C.L., & Daud.Y.(2010). The effect of cooperative learning on Students Mathematics achievements and attitude towards Mathematics. *Journal of social Science*, 6(2): 272-275.

Table No. 1 showing the difference between mean scores of experimental group and control group on pre-tests.

Groups	Control Group	Experimental Group	D _f	T _(Tab)	T _(Cal)
N	32	32			
Mean	8.65	8.61	61	2.0*	0.057**
SD	3.168	2.85			

*tabulated t-value **calculated t-value at 0.05 significant level
 n = numbers of students M = statistical means SD = standard deviation
 D_f = degree of freedom

Table No. 2 showing the difference between mean scores of experimental group and control group on post-test.

Groups	Control Group	Experimental Group	D _f	T _(Tab)	T _(Cal)
N	32	32			
Mean	14.42	12.86	61	2.0*	2.11**
SD	3.03	4.01			

*tabulated t-value **calculated t-value at 0.05 significant level

Table No.3 showing the difference between mean scores of control group on pre-test and post-test.

Control Group	Pre-test	Post-test	D _f	T _(Tab)	T _(Cal)
N	32	32			
Mean	8.65	12.86	61	2.03*	4.58**
SD	3.168	4.179			

*tabulated t-value **calculated t-value at 0.05 significant level

Table No.04 showing the difference between mean scores of experimental group on pre-test and post-test.

Experimental Group	Pre-test	Post-test	D _f	T _(Tab)	T _(Cal)
N	32	32			
Mean	8.61	14.42	61	2.04*	7.73**
SD	2.86	3.03			

*tabulated t-value **calculated t-value at 0.05 significant level

Table No. 5 showing the cumulative responses of students regarding attitude towards cooperative learning.

	DA	UN	A
N	1	2	27
% of responses	3.3	6.6	89.9

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2. The standard format should be abstract, introduction, review of literature, material and methods, result, discussion, conclusions and recommendations followed by references/literature cited (in alphabetical order). Reference must appear in the text and preferably for the last 10 years.
3. Number of tables be restricted to minimum possible.
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