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Title: Impact Assessment of Rooftop Rain Water Harvesting: A Case Study of Bagh and Battagram Districts

Abstract

Water is a basic necessity for all living beings, and without it life is not possible. Water availability remains a serious issue in both urban and rural areas in the developing world particularly, in earthquake prone and hilly areas. Majority of the population of Pakistan is living in rural areas, where access to safe drinking water is very serious issue. In order to resolve the water crisis in Pakistan, government as well as number of private agencies (NGOs) is working on water management. Different approaches, including Rooftop Rain Water Harvesting (RRWH) technology are being taken up for supplying water to the population. In this regard, a project of RRWH technology was initiated by Earthquake Rehabilitation and Reconstruction Authority (ERRA) Pakistan in Bagh, Azad Jammu Kashmir (AJK) and Battagram, Khyber Pakhtunkhwa (KP), Pakistan. There was need to evaluate the socio economic impact of this technology. Present study is the assessment of RRWH technology with special reference to women health and time allocation. Analysis was carried out using statistical and econometric techniques. Specifically, study has used Negative Binomial Regression (NBR) and Ordinary Least Square (OLS) techniques to quantify the results. Moreover, financial appraisal of the technology using Net Present Value (NPV), Economic Rate of Return (ERR) and Pay Back Period is also carried out in this research. The findings of the study revealed that RRWH technology is viable, profitable, women friendly and sustainable source of water supply.

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Title: Valuation of Ecosystem Services in Terms of Stored Carbon: A Case Study of Margallah Hills, National Parks, Islamabad

Abstract

The aim of the study was to first prepare the biomass inventory of the MNHP, then to estimate total stored carbon and thirdly to find out the value of carbon sequestration service of MNHP in major tree species. The study was conducted in MNHP which are the foothills of Himalaya with a rugged and mountainous terrain. The study consisted of 340 samples of 10 x 10m each. The first objective was achieved using a log linear regression model using Tree height, tree girth and wood density as variables with the r^2 of 0.94. Samples were taken randomly in an area of 40km approx. using global positioning system as reference point for the selected samples. Study using these coordinates produced a digital map of the area showing the sampling sites and the outer bound of the selected area. Tree heights were measured with measuring rod and tree girth was measured using measuring tape while the data on wood density was calculated through partial felling of the trees in sampling area, and taking wooden discs, fresh volume and fresh weight were measured on field while the dry weight and volume were calculate in lab by oven drying the discs at 12% moisture to 70C° temp. The second objective was achieved by using the biomass inventories to produce the amount of total stored carbon in major tree species, following a study conducted in greater Mekong Basin China. The study achieved the third objective by following *P, Timothy Pearson (2008)*. The carbon sequestration capacity is assumed to be 50% of biomass carbon density, one ton of carbon can be further converted into 3.6 tons of CO₂.

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Title: Impact of Seasonal Migration on Livelihood in Cholistan Desert: A Case Study of Bahawalpur Division

Abstract

In Cholistan Desert increased frequency of droughts and low rainfall is affecting the life of its inhabitants. Major source of livelihood in Cholistan is livestock but due to low rain fall, shortage of water and long droughts their number is continuously decreasing, leading to the economic instability and financial problems for nomads.¹ Water shortage is one of the major reasons of mobility of nomads. They move from one water sources (Toba) ² to another for their survival. As the water scarcity is rising the livestock holdings are adversely affected putting the pastoral nomads in a critical situation in terms of their livelihood. In order to improve the livelihood of nomads in Cholistan, Government distributed land among some desert residents. The land acquisition has resulted in seasonal migration between the canal area where land is allotted and the place of original residence. The land holders move to land in canal side during winter season, when the water shortage in desert area is acute. They cultivate the land which is provided by the Cholistan Development Authority (CDA). In summer they move back to desert with their livestock. This work focuses on issues related to livelihood of the Cholistan people. The study, further, aims to explore factors underlying the migration (mobility) patterns of nomads. More importantly, the impact of seasonal mobility on the economic conditions of the people living in the Cholistan desert is also gauged.

Supervised by: Dr. Rehana Siddiqui



Mohammad Zohaib Saeed

**Title: Impact Evaluation of the Socioeconomic and Agricultural Productivity of a Mini Dam:
A Case Study of Kawas Dam, Ziarat, Baluchistan.**

Abstract

Water is a basic constituent of life. All living creatures are directly or indirectly dependent upon it. Water is a natural resource which is scarce. Demand for water exceeds its supply. Therefore, many private and Government organizations are working for finding ways to cope with this problem both at local and international level. One of the long term solutions is watershed management. The short term goal is to build small and large dams with the aim to store water in wet times and provide water in dry times. The study is based on a mini dam located in the province of Baluchistan, which is comparatively backward among all provinces in Pakistan; having serious issue of water scarcity and possess an ideal condition and suitable climate for cropping. The study is conducted to evaluate the impact of mini dam on socioeconomic and agricultural productivity in Ziarat district. The altitude and climate of Ziarat favors the production of Apple crop, which provides the basis for that community's livelihood. Statistical and econometric techniques were used for finding the empirical analysis. Specifically, Financial and Economic analysis was carried out for doing benefit cost analysis and Cobb-Douglas functional form using OLS technique was also used to quantify the data for Apple production function. Results conclude that mini dam had a positive impact on the livelihood of people and had contributed in improving their living standard.

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Title: An Application of Contingent Valuation Method for Reduction in Risk of Premature Mortality due to Air Pollution: a case study of Gujranwala, Pakistan

Abstract

In present Anthropocene Epoch air pollution (AP) had crossed the safe limits in urban world. In Pakistan the annual growth rate of GHGs is 3.9%. The concentration of CO, CO₂, SO₂, and particulate matter is above the NEQS, while the O₂'s level is less than the NEQS in Gujranwala City, the study region. Respiratory and cardiac patients are considered in this study and their numbers in the considered zone have shown an increasing trend. The purpose of the study is minimization of risk of premature mortality imposed by the AP borne diseases. Through assessing willingness to pay (WTP) of the people, could be exposed to risk, for measures to control adverse impacts of AP. The methodology used consists of Contingent Valuation Method, Stratified Random Sampling, and Logit Model. WTP taken as dependent variable and household's monthly income (X₁), respondent's education level (X₂), health cost(X₃), air pollution deteriorates health versus no affect (X_{4i}), respondent employed versus unemployed (X_{5i}), air pollution cause premature mortality or not (X_{6i}) are the independent variables. X₁, X₃, X₄ and X₆ affect significantly WTP while X₂ and X₅ were found to be insignificant. The results of the study support the objective of the study that people are WTP to minimize the risk of premature mortality. The monetized value, aggregate WTP, for minimization of risk of premature mortality is known as value of statistical life (VOSL). VOSL is trade-off between small risk and wealth. The VOSL for the considered risk reduction options 1-in-1000, 5-in-1000 and 10-in-1000 are PKR 387286, PKR 664000 and PKR 931000 respectively. A decreasing trend was found in forgone resources to save an additional person at risk and this was because of the limited resources of the respondents.

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Title: Analysis and Forecasting of Environmental Trend and its Implication for Wheat Yield

Abstract

The climate change has important and measurable effects in Pakistan. The objective was to forecast the overtime environmental trend in Pakistan with a special reference to GHG emissions and climate change and to analyze the impact of temperature, rainfall and humidity on wheat yield in Chakwal, Jehlum, Mianwali. A time series data from 1971 to 2010 was used for forecasting purpose and a panel data from 1986 to 2010 was used to achieve the second objective. The results of the analysis have shown that the overtime environmental indicators are showing an increasing trend. Furthermore, climatic variables have been found to have significant impact on wheat yield. It was thus concluded that the climate change is the major determinant of wheat productivity.
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Title: Vulnerabilities to Food Security in Barani Area of Punjab

Abstract

The very concept of vulnerabilities has threatened the uniqueness of human civilization at global context. The impression of such global changes has affected the most developing nations of the world. Countries like Pakistan are the victims of vulnerabilities like; climate change. This variability's are becoming the greater threat to the food security issues in developing world. The majority of the developing world is unsuccessful to develop a significant food security strategy(s) at national level. Since food security is one of the most important objectives of our national development strategy and Household food security is the application of this concept to the family level, with individuals within households as the focus of concern. The research focuses on the most important stake of food security which is sustainable agricultural growth; which is more dependent on water availability in right time. This pattern of water is totally reliant on climatic conditions. The concept of food security is not simply a function of production or supply, but of availability, accessibility, stability of supply, affordability and the quality and safety of food. These factors include a broad spectrum of socio-economic issues with great influence on farmers and on the poor households. The majority of the farmers in the Barani region of Punjab are; small-scale farmers. And these farmers are constrained by access to markets, while inputs, such as fertilizers and seed, are expensive. With lack of irrigation water, infrastructure and investments, and low availability of micro-finance combined with dependency on few multinational suppliers, crop production is unlikely to increase in those regions where it is needed the most, unless major policy changes and investments take place. These constraints become insupportable with conflicts and corruption. And above all variations in climate change make it more prone to the victimized communities, which give birth to very many social problems including gender disparities, sanitation and hygiene problems. The research focuses on all such issues in reference to Barani region of province of Punjab Pakistan. In order to determine the vulnerabilities on food securities in the Barani region of Punjab we will be using Christiaensen and Boisvert economic model of vulnerability. We'll be using Generalize Least Square (GLS) model to determine the level of effect of vulnerabilities to food security issues in respective regions. In this very model we assume that all the cross sectional variability of our crucial variable – dietary energy consumption, measured through kilocalorie – depends on the household's observable characteristics. This assumption allows us to estimate vulnerability using cross sectional data from a single point in time, thereby limiting data requirements. The study takes household consumption index as proxy of vulnerability.

Supervised by: Dr. Usman Mustafa



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Title: Role of Mangroves Eco System in Poverty Reduction – A Case Study of Bhira Village in Balochistan

Abstract

This study focuses on the role of mangrove ecosystem in poverty reduction in Bhira village District Lasbela. The objective of the study is to find the contribution of mangrove ecosystem fishing. A survey based method is used to find out the results. It is cross sectional data and total sample size is 110 households. Simple OLS technique is used for the estimation. The estimation results indicate that in the village fishing is main occupation of people. While the current production of fish catch (kg) reflects that due to the mangrove degradation the production of fish catch (kg) has decreased as compared to the production of fish catch in five and ten years ago when the mangrove ecosystem was better in the area. The poverty head count is 63.4 percent which shows higher incidence of poverty among fishermen in Bhira village. The mangrove also provides many other services such as protection from storm and flood, use as firewood, fences and framing of roof. The study concludes that the mangroves play key role in the livelihood of local community.

Supervised by: Dr. Rehana Siddique



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Title: Willingness to Pay for Solid Waste Management Services: A Case Study of Islamabad

Abstract

Solid waste management remains a serious problem in most of the developing world, although it consumes a larger portion of municipal budgets. In the current project, a number of solid waste management studies were conducted for Islamabad city mostly focusing on the generation, collection and disposal of waste. Moreover, a contingent valuation survey approach was applied for the project. A stratified random sampling technique was applied for sample size selection of five hundred respondents. A double bounded dichotomous choice questions followed by an open ended question format was used to elicit willingness to pay and maximum willingness of the respondents. The logistic regression estimation reveals that 65.4 percent of the total respondents are willing to pay, while multiple regression reveals a monthly mean willingness to pay of Rs. 289.15 which is greatly affected by age, household income, education and environmental awareness i.e. respondents with higher levels of education and income show higher willingness to pay. These collected data can specifically help in formulating the solid waste management services while in general can add up its role for the improvement of environmental quality.

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Title: Impact of Climate Change on Agricultural Land Values: An Application of Ricardian Model in Punjab

Abstract

The study instigates the incident of climate change and its impact on agricultural land value of Punjab primarily addressing the adaptation factor. A Ricardian analysis approach has been used to walk around the subject how idiosyncratic climate patterns affect land value in Punjab while considering twenty districts of the province Punjab. Data on agricultural land values for each district is taken from Punjab Economic Research Institute from 2004-2008. In order to estimate the climate change model, EGLS technique with cross section white covariance is used in the study. From the assessment it is very much clear that average rainfall has a highly significant U-shaped relationship with agricultural land values. It implies that 1mm increase in rainfall will result in decrease in agricultural land values by 650214 Pak rupees per hectare. On the other hand, the square term of average precipitation shows a positive and highly significant relationship which confirms the hill-shaped relationship among land values and climatic variables. This concludes that the present level of precipitation is inadequate for the agricultural land which results in departure of land value downward. Similarly, in case of humidity the linear relationship between land value and humidity is positive. . It predicts that if humidity increases by 1 per cent it results in increase in land value by 302798 Pak rupees per hectare. Unlike other studies, the present study predicts that maximum temperature plays a negligible role in farmer's decision making. The study has given a broader look of the subject matter by including the district wise interactive dummies for each district to further elucidate the analysis. To see the VIII district wise effects of rainfall, we have included nineteen dummies as interactive terms in our estimated equation. Similarly, the same procedure has been carried out for the rest of the district dummies. This means that we have allowed slope coefficient for rainfall to vary from district to district. Our result shows that the highest positive effects of rainfall are in district Rawalpindi where one millimeter increase in average rainfall lead to increase the land value by more than a half million of Pak rupees.

Supervised by: Dr. Usman Mustafa



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Title: Green Growth: An Environmental Technology Approach

Abstract

This research is focused on achieving green growth through an environmental technology approach. Developing environmental technology we examined four elements considering the enforcement of intellectual property rights (IPRs), research and development (R&D) expenditures, the size of the market capture by GDP and most importantly the environmental taxations. This study includes the 11 developed countries which are Austria, Australia, Canada, France, Japan, Finland, Germany, Sweden, U.K and U.S. Technology change can be better handled by panel data than by pure cross-section or pure time series. It can minimize the bias if we used the aggregate individuals or firms. Estimation techniques depend on short panel or long panel. This study used the Pooled Least Square estimation techniques like Fixed Effect Model (FEM) and random effect model (REM) for both balance period of 2000-2005 and unbalanced period from 1995-2005. The study concluded the policy formulation in making developed's climate resilient economies.

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Title: Quantifying Vulnerability to Climate Change

Abstract

Commercially motivated country indices ranking the degree of vulnerability to climate change across nations represents a „number“ aimed at directing, inter alia, development, disaster and aid efforts among countries. These indices however, fail to highlight sub-national vulnerabilities existing within countries being ranked. Using the IPCC’s definitions of vulnerability in the context of climate change as a reference source this study devises a district level vulnerability to climate change index for 22 districts of Pakistan. The Index shows that there exists a varying degree of vulnerability between districts and a further variation within the rural, urban and gender divides of each district.

Supervised by: Dr. Aneel Salman



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Title: Assessment of Awareness about Clean Drinking Water and Adequate Sanitation in Bhara Kahu, Islamabad

Abstract

This study attempts to investigate awareness level of the households (HHs) about clean drinking water and adequate sanitation in Bhara Kahu, Islamabad. The study further assessed HHs willingness to pay (WTP) for improvement in water quality and sanitation system on the basis of their socio-economic characteristics. For the study 150 Households were randomly selected. The data was obtained through structured questionnaire. Bivariate logistic regression model and ordinary least square (OLS) method were used. The first model was used for assessing awareness about clean drinking water, threat to health and environment from inadequate sanitation. For assessing WTP, OLS method was adopted. The study revealed that female awareness regarding water quality and threat to health and environment was found to be higher compared to males. Further, the study shows that income and education has positive and significant relationship with both awareness about water quality, threat to health and environment from inadequate sanitation system. The relationship of income and education with WTP for improvement in water quality and sanitation system was also found to be positive and significant. On the basis of research work, study recommends that there is a need of encouraging education and improving income of the households, in order to raise their awareness about water and sanitation issues. It will also increase their WTP for improvement in water quality and sanitation system. As, highly educated and high income individuals become more health conscious.

Supervised by: Dr. Usman Mustafa



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Title: Institutional Quality and Environmental Kuznet Curve in SAAC Countries

Abstract

This study aims to explore the relationship between environmental quality and institutional quality. The paper has tested the validity of environmental Kuznets curve (EKC) for selected (Bangladesh, India, Pakistan) SAARC countries in case of carbon dioxide and sulfur dioxide emissions. The panel covers the time period between 1984-2011 for CO₂ and 1984-2008 for SO₂ emissions. This analysis has used Panel Fixed Effect Least Square technique. The results showed that (EKC) hypothesis holds for both type of pollutants in the selected countries. Quality of governance and political institutions may lower down the turning point of (EKC) in both cases. It has been found that turning points are 119US\$ and 1325US\$ higher for CO₂ and SO₂ respectively in absence of better quality of governance and political institutions. The results suggest that there is a need of cooperation and strict environmental laws at regional and country level.

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Title: An Evaluation of Ground Water Pollution Risks on Child Health: A Case Study of Inhabitants of Manka Drain, D.G. Khan, Punjab Pakistan

Abstract

Water is life for all living things but due to over population and pollution, its stock is going to deplete. Besides, open drainage system in many developing countries is another major source of ground water pollution. Polluted water poses a serious threat to the health of the population. This study is designed to investigate the health risk to residents living near the Manka drain (an open drain) in D.G. Khan, Pakistan. To know the household's (HHs) socio economic status, their awareness about water pollution and their willingness to pay (WTP) for safe drinking water, primary data was collected from the HHs through a well-structured questionnaire. Bivariate Logistic Regression as well as ordinary least square methods was used to know the HH's WTP in the polluted and non-polluted areas. The study demonstrated that the ground water was depleting because of the drain. On the other hand, higher income and educated group of people living in the selected area were found WTP for safe drinking water facility. Recommendations have been made to minimize the adverse impact on health of the children and in general the community living in the vicinity of the Manka drain in D.G. Khan.

Supervised by: Dr. Usman Mustafa



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Title: Joint Efficiency Analysis of Thermoelectric Power Plants in Pakistan

Abstract

The study undertakes efficiency analysis of thermal power generation in Pakistan with an eco-efficient perspective. Eco-efficient behavior ensures sustainability of nature, while eliciting the economic growth. Thermal power generation has a lion's share in the fuel mix of the energy sector in Pakistan. The economic and environmental efficiency of 32 thermoelectric power plants was determined by Stochastic Frontier Analysis. The efficiency analysis revealed that none, among 32 thermoelectric power plants were operating on the efficiency frontier. The efficiency scores in two scenarios ranged between 0.50 - 0.65. The analysis showed that coal is the most inefficient technology, followed by Furnace Oil. However power generation by Gas is comparatively cheaper and environmentally less detrimental. Plants with higher generation capacities, and plant operated by private entrepreneurship turned out to be more efficient than the small plants, and state owned plants. Coal has the highest shadow cost Rs.8.54followed by Furnace Gil and Gas. The study concludes that power generation by combustion of fossil fuel is highly inefficient, both economically and environmentally. Therefore it is acclaimed that energy policies must be intertwined within the eco-efficient criterion. Moreover the study suggests the restoration of hydropower generation, which is both economically and environmentally valuable.

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Title: Observations on Conservation and People Attitude towards Endangered Species (Snow leopard in KP) with Special Reference to Chitral

Abstract

In recent times, the world has lost its biodiversity up to a greater extent as a result of species extinction. But the developing world is the most affected in terms of species loss due to agricultural expansion, weak enforcement of environmental rules and regulations. In Pakistan, there are 37 species and 14 sub-species which are internationally threatened or near threatened mammals and snow leopard is one of those endangered species. There are recent initiatives in Chitral for the biodiversity conservation especially such as “the community-based snow leopard conservation”. But the effectiveness of the conservation is questionable. Keeping in view the conservational issues, this study is designed to evaluate the behavior and attitude of local people towards the conservation of snow leopard in Chitral district of Khyber Pakhtunkhwa. To know the household's socio-economic status, their awareness about the snow leopard as an endangered species and their willingness to pay (WTP) for the conservation of snow leopard, primary data was collected through well-structured questionnaire from the Households in Chitral. Then, a binominal logistic regression was used to know the households WTP for the conservation of snow leopard and its determinants in the conservatory and non-conservatory area. The study evaluated that the increased number of livestock in the area and its predation by the wildlife in general and snow leopard in specific are the main hurdles in the way of conservation initiatives. On other hand, those group of people in the selected area were found willingness to pay (WTP) for the conservation of snow leopard who have membership in gross root institution/s, highest education of the family, higher family income, living in the jurisdiction of conservational area, income from eco-tourism activities, experienced weight losses and death costs of their livestock's other than wildlife predation (diseases). Furthermore, recommendations have been made to overcome the problems in the way of conservation of snow leopard in Pakistan in general and Chitral in specific. Supervised by: Dr. Usman Mustafa



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Title: Relationship between Economic Growth, Energy, and Emissions: A Case Study of Pakistan

Abstract

This study seeks to examine whether the energy consumption from different sources adds up to economic growth or halts the economic growth and are these different sources also cause the carbon dioxide emissions. The relationship between the energy consumption and economic growth is investigated with the other traditional growth model variables (i.e. capital, imports, inflation, labor etc). The relation for the carbon dioxide emission and different sources of energy consumption is investigated in the second model where the sources coal consumption, oil consumption and gas consumption are included to check the impact. The results suggest that the energy consumption takes parts in the process of the economic growth positively and significantly and the case of variables for the carbon dioxide emissions also suggests that these are contributing in the process of increment in the emission production. The evidence is gathered through application of Autoregressive distributed lag (ARDL), Granger Causality, and Error Correction Mechanism.

Supervised by: Dr. Usman Mustafa

Title: Willingness to Pay for Improvements in Water Quality and Services: A Case Study of Multan City

Abstract

This study analyzed the status of drinking water supply and quality and customers willingness to pay for improvement in drinking water supply and quality in Multan city. Required information was collected from through stratified sample of selected 210 households from Shah-Rukun-e-alam and Mumtazabad. The contextual information was analyzed through descriptive statistics and weighted average indexes whereas the demand function for hypothetical improvements was determined using multiple bound choice Contingent Valuation Method (CVM) and Logit regression. The findings revealed that respondent accorded high importance to safe drinking water compared with other household needs. This was because of their high level awareness about the link between health and safe drinking water. Respondents used multiple sources of drinking water. Tap water, water from public filtration plants and borehole were the primary, secondary and tertiary water sources, respectively, in the study area. Most of the households perceived the quality of their existing drinking water as good for drinking purposes. Such perception was not well grounded as most of them relied on their sensory appraisals of water quality and only a little more than one fourth of them had tested their water from laboratory. In such situation, despite awareness insignificant attention has been devoted to in-house water treatment. Situation of drinking water storage was relatively satisfactory as about half of the respondents were using insulated and simple plastic canes cleaned on weekly basis while most of the remaining households were storing it in rooftop tanks cleaned twice a year. Almost all of those bringing water from publically installed filter plants were storing it in cane. While half of those using tap water for drinking purposes were storing it directly from supply line before it is released into rooftop tank for washing purposes. The remaining half of the households using tap water were storing it in rooftop tanks and using it for all purposes including drinking. Despite high level of satisfaction with water quality and supply, people could come with the demand for some of the improvements. Seemingly, demand for improvement in supply parameters has exceeded that of the quality parameters. Even in service improvement, high demand was observed for improving reliability through installation of generators and establishment of customer care. Most of the respondent realized government budget constraints in providing demanded improvement. Within the bounds of certain degree of surety and confidence, it would be safe to expect that significant majority of the respondents would pay PKR 100 in addition to the amount they are paying at the moment. Most the WTP in this study is explained by level of people's awareness about the water and health consciousness. Among the most significant variable leading to major increase in peoples WTP included per head income, number of children under 14 years age, knowledge about health and water linkage, knowledge about the actual water quality tested through laboratory explained major proportion for their WTP for improved drinking water quality and supply. The study recommend different options as mobile water testing laboratory and health care complain through clinics, use electric and print media for raising awareness in order to raising people's WTP for safe drinking water.

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Title: Intra-Industry Trade and Environment in SAARC Region (An Application of the New Trade Theory)

Abstract

Does increase in the intra-industry trade a source of environmental externalities in the region? This is a question, which is addressed in this thesis. Accordingly; this thesis investigates the trade and environment relationship by making use of the new trade theory. The new trade theory refers to the imperfect competition, increasing returns to scale, choice of variety and specialization in a limited range of production of differentiated goods. By using the new trade theory, this study thus examines the trade induced environmental effect that is disintegrated into three components; namely, scale effect, technique effect and selection effect. It is the selection effect that differentiates the effect of inter-industry trade from the effect of intra-industry trade on the environment. Earlier empirical studies generally ignored the selection effect due to frequent use of overall trade induced environmental composition effect in the trade and environment literature. Trade induced environmental composition effect emphasizes on environmental effect of trade due to change in factor intensity. But this thesis uses trade induced environmental selection effect instead of trade induced environmental composition effect. The environmental selection effect is the change in emission level due to change in the selection of differentiated products, while trade induced environmental selection effect is the change in emission level due to change in the selection of differentiated products as result of trade liberalization. In the absence of data on differentiated products, empirical research studies suggest that number of firms can be used as a proxy for differentiated products. This study uses number of listed firms instead of differentiated products. The environmental scale effect is a change in the level of emission due to change in the scale of production; on the other hand trade induced environmental scale effect is a change in the level of emission due to change in the scale of production by virtue of trade liberalization and the environmental technique effect, shows the relationship between income and emissions; while trade induced environmental technique effect, shows the relationship between income and emissions due to trade liberalization. Disintegration of trade induced environmental effects is thus an integral part of this study. Another important element of this thesis is policy recommendations on the basis of empirical analysis.

Supervised by: Dr. Zafar Mahmood



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Title: Evaluation of Non-Market Value of Rohtas Fort

Abstract

This study aims to evaluate non-market value of Rohtas Fort. This study is based on primary data collected from 200 visitors, selected randomly. The data was obtained through structured questionnaire. For analysis Individual Travel Cost Method, descriptive statistics, priority and satisfaction indices were used. Findings revealed that the annual consumer surplus for an individual visitor was Rs. 7781 while the annual total consumer surplus was Rs. 855.92 million. Consumer surplus can be improved up to Rs. 883.32 million per annum if desired improvements are made. The total recreational (use) value of the Fort was Rs. 1150.45 million and this can be increased to Rs. 1177.85 million if desired services are provided. The major influencing factors of visitation frequency were observed as Travel Cost, Household Income, Age, Household Size, Education and sex dummy followed by their respective coefficients as -0.00134, 0.0000035, -0.039, -0.26, 0.087 and 0.63. The satisfaction index value of 1.1 showed that visitors were highly satisfied for museum as compared to other services. Sample visitors reported dissatisfaction for the waste disposal services, with index value of -1.21. Cleanliness is a major problem faced by visitors with highest priority index value of 0.88. Because on findings of the study, it is recommended that the authority should arrange proper waste disposal system. In addition, the authority should solve the problems of renovation and reconstruction, public parks, parking, maps and direction signs in the Fort, which will ultimately add to the value of the forte. After providing the desired services, the authority would have sufficient resources for renovation and maintenance. The authority can use this estimated consumer surplus to find the optimal entrance fee for the Fort.

Supervised by: Dr. Anwar Hussain

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Title: Impact of Housing WATSAN Facilities on Health: Evidence from Pakistan Panel Household Survey 2010

Abstract

Health is undoubtedly a basic requirement and an important factor of human life. One of the major factors in health degradation is housing environment, which includes housing material, household water source, household sanitation, household waste disposal and indoor air pollution. Health varies with different socioeconomic, demographic and environmental characteristics. The study analyzed the association of different socioeconomic and environmental factors on health. A detailed analysis was done on the effects of housing WATSAN facilities on health through bivariate analysis and multivariate analysis using logistic regression. The association was measured through three indicators: total population reported ill; population reported ill with water borne diseases; and children reported ill with diarrhea. Result showed that different socioeconomic had a very strong association on health of the individuals. Another objective was to measure effects of WATSAN facilities on health. The multivariate analysis the probability of falling ill increased in populations living in households having no piped water source and no drainage system. Whereas the population reported ill with water borne diseases and diarrhea showed significant association for both bivariate and multivariate analysis where the likelihood of falling ill with these diseases increase significantly in the houses lacking both the proper toilet facility and covered drainage system. As for the unsafe source of drinking water, it showed no relation in increasing the likelihood of falling ill with diarrhea and water borne diseases. Pakistan's socioeconomic and demographic factors strongly affect health; water borne diseases and diarrhea have more significant association with sanitation facilities rather than with source of drinking water.

Supervised by: Dr. Durr-e-Nayab

Title: Impact of Climate Change on Crop Productivity in Pakistan

Abstract

This study assesses the impact of major climate variables (temperature and rainfall) on crops productivity across four agro ecological zones of Pakistan. The crops selected were rice, wheat, maize, cotton and sugarcane. The study used panel data from 1991 to 2010 taken from Federal Bureau of Statistics (1982-2009), Khyber Pakhtunkhwa Development Statistics (2010), Punjab Development Statistics (2011), Statistical Pocket Book of the Punjab (2011) and Pakistan Meteorological Department Islamabad. Analysis has been made through applying pooled least square estimation techniques namely fixed effect model and random effect models. The results revealed that the effect of climatic variables on crops yield varied across agro climatic zone due to differences in their climate condition. Temperature and rainfall were the important determinants affecting crops productivity across agro climatic zones of Pakistan. Further in Indus Delta (Zone I) increase in rainfall favored rice and sugarcane productivity and affected wheat productivity adversely. Also increase in three different temperatures ranges (maximum, minimum and average temperatures) positively affected wheat, rice and sugarcane yields. In Northern irrigated Plain a (Zone IV) increase in three different temperatures ranges (maximum, minimum and average temperatures) increases wheat, rice, cotton and sugarcane productivity and negatively affected maize yield. Similarly increase in rainfall favored maize, wheat, rice, cotton and sugarcane yield in Zone IV. Increase in rainfall and three different temperatures ranges (maximum, minimum and average temperatures) had a positive impact on major crops i.e. wheat, maize and sugarcane yield in Northern irrigated Plain b (Zone IV). In Wet Mountains (Zone VI) increase in temperature favored wheat and maize productivity while increase in Kharif season rainfall has affected negatively the maize yield. Similarly in Northern Dry Mountains (Zone VII) increase in three different temperatures ranges (maximum, minimum and average temperatures) had a positive impact on wheat, rice and maize yield while increase in rainfall adversely affected maize yield. Wheat productivity has been impacted more in Northern Irrigated Plain a (Zone IV) by average temperature and in Northern Dry Mountains (Zone VII) by rainfall than the other zones. Rice productivity has been impacted more in Dry Mountains (Zone VII) by average temperature and in Indus Delta (Zone I) by rainfall than the other zones. Sugarcane productivity has been impacted more by average temperature and rainfall in Indus Delta (Zone I) than zone IV. Maize productivity has been impacted more by average temperature and rainfall in Northern Dry Mountains (Zone VII) than the other zones. Finally the study recommends proper mitigate and adaptive strategies to enhance the positive and lessen the adverse impact of climate change on crops productivity across agro climatic zones of Pakistan.

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Title: Economics of Natural Disasters: (A study of selected SAARC countries (1973 to 2011)

Abstract

Natural disasters are by no means new, yet the evolving understanding of their relevance to economic development and growth is still in its infancy. Natural disasters affect all the countries irrespective of the land size, cultures, geographic locations and economy size, but developing countries in particular, with disproportionate number of deaths, displacement and damages to infrastructure. This study summaries the state of the economic literature examining the aggregate impacts of disasters for a panel of five south Asian countries over the sample period of 1973 to 2011. The study reviews the main disaster data sources available, discusses the determinants of the direct effects of the natural disasters and distinguishes between the total killed, affected and estimate damages of natural disaster over the past four decades. The disaster data is taken from EM-DAT (2011) database, and estimated by employing ordinary least squares (OLS) methods. The results show that natural disasters affect the economies not only in negative directions but in some cases it has positive impacts on selected countries.

Supervised by: Dr. G.M. Arif



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Title: Economic and Environmental Perspectives of Micro Hydro Power: A case study of District Dir (Upper) Khyber Pakhtunkhwa

Abstract

The recent energy crisis combined with environmental degradation has led the planners to switch to renewable and clean energy technologies. The present study aims to estimate the cost and benefits of Micro hydro power (MHP) plants in rural areas of District Dir (U) Khyber Pakhtunkhwa. The study further assesses the environmental sustainability followed by identifying the challenges in the way of Micro Hydro Power plants. For the analysis, both primary data as well as secondary data is used. Descriptive statistics, Financial and Economic analysis followed by Participatory Reflection and Action (PRA) are used for the analysis of data. The result of the study shows that the expenditure made by MHP connected households on alternative energy sources is less as compared to the expenditure made by WAPDA connected households. Financial and Economic analysis show that MHP is a feasible and viable technology. Further, the available MHP units in the area can reduce the Green House Gas (GHG) emissions by 3180 tons of CO₂eq per annum by replacing the use of fossil fuels. By registering the project with CDM, it can earn \$95400 per annum. Based on these results, policy makers should support and encourage renewable energy installations in rural areas in the form of Micro hydro power technology. The government should also establish technical training institutes to impart basic skills to the operators of the plants. There is also a need for proper institutional arrangement to tackle the issues of floods, repairing and other social issues. These projects can be registered with CDM to earn certified emission reductions.

Supervised by: Dr. Anwar Hussain

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Title: The Nexus of Foreign Direct Investment, Economic Growth and Environment in Pakistan

Abstract

This thesis aims to investigate important cost (environmental degradation) and benefit (GDP growth) of sectoral FDI in Pakistan. The study uses time series secondary data from 1972 to 2011, taken from State Bank of Pakistan (SBP), World Development Indicators (WDI) and Statistical, Economic and Social Research and Training Centre for Islamic Countries (SESRIC). The Auto Regressive Distributed Lag (ARDL) model has been incorporated to estimate the impact caused by sectoral FDI inflow on Carbon dioxide emissions along with population density variable and to estimate the impact caused by sectoral FDI on GDP along with energy consumption and labor force variable. The results showed that FDI inflow in manufacturing and transport, storage & communication sector is responsible for the CO₂ emissions in Pakistan. Interestingly FDI inflows in mining and quarrying sector are not directly involved in CO₂ emissions. The results also indicate the presence of EKC's within long and short run, furthermore FDI inflow is responsible for environmental degradation in Pakistan. Furthermore, the population density also has positive and significant relationship with Carbon dioxide emissions. FDI inflows in manufacturing and transport, storage & communication have positive effect on the GDP growth. In addition, energy consumption contributes positively towards GDP growth. Interestingly labor force has insignificant relationship with GDP growth. It is therefore recommended that FDI inflow in manufacturing sector and transport, storage and communication sector should only be allowed if it fulfills the environmental concerns. Secondly population variable should be handled because it has effects on both environmental degradation and economic growth. If the technology transfer take place under FDI then it should strictly take place under the regulation set by United Nation Framework convention on Climate Change (UNFCCC).

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Title: Socio-cultural and Environmental Impacts of Tourism: A Case Study of District Swat

Abstract

Tourism development, as one of the outward oriented economic policies, is expected to create more job opportunities, increase income of the local community and would also carry a social, cultural and environmental value with itself. However, as is the case with many economic policies, concerns have been raised with regard to the negative social, cultural and environmental consequences associated with tourism development. Thus the purpose of this study is to know the positive and negative perceived social, cultural, and environmental impacts of tourism on local communities in Swat Valley. To this end, data has been collected, using a well-structured and self-administered questionnaire, from 250 respondents from Swat valley. The analytical tool kit of the study includes descriptive statistics (such as frequency distributions and means) to shed light on the socioeconomic and demographic characteristics of the respondents, and some group statistics along with independent sample t-test for comparing various means of interest. The findings of the study with respect to net tourism effects are mixed. In particularly, the analysis reveals that the perceived negative social impacts of tourism are greater than the perceived positive social impacts of tourism in Swat Valley. Similar is the case with net perceived environmental impacts of tourism where negative environmental consequences of tourism in Swat valley outweigh the positive environmental impacts. However, the findings of this study shows that perceived positive cultural impacts of tourism in Swat are significantly greater from the negative perceived cultural impacts. Thus, in light of these findings, we recommend some policy options for the authorities so that tourism development in the area is made more fruitful for the local community. In particular, we recommend the law and order enforcing agencies to control some anti-social and cultural aspects of tourism (e.g. crime) and to the tourism industry to devise policies for effectively reducing stench and other waste materials generated by the industry.

Supervised by: Dr. Usman Mustafa

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Title: Global Climate Conventions and Policy Issues Carbon Trading Prospects in Lieu with Sustainable Development by Transfer of Technology

Abstract

The study ponders over the critical issues of climate change and associated global conventions. Under climate conventions, the input output (IO) analytical approach has been applied to perceive the economic aspects of Carbon Emission Trading in line with Kyoto Protocol under United Nations Framework Convention on Climate Change (UNFCCC). The Global Trade Analysis Project (GTAP ver-7) database has been applied which is widely used for global economic and environmental studies. Moreover, Inter-governmental Panel on Climate Change (IPCC) technical reports have been used extensively to highlight the issue of global warming led climate change coupled with scientific findings. From the environmental economic assessment, it is observed that Pakistan has been getting less from the share of Carbon Emission Trading than the major states for carbon embodied in the finished products and commodities. Moreover, an approach to use carbon credits with sustainable green technology transfer has been focused under climate negotiations. The findings show that Pakistan needs proper policy planning for sustainable green technological support to the production sectors of agricultural, industrial as well as services. The conclusion ponders that international environment cum economic relations are important in an era of global climate change and facilitate mutual growth in diverse areas to pacify lives of poverty stricken citizens. The transfer of sustainable green technologies under climate conventions with multilateral environmental agreements would be beneficial for the man of the planet earth globally.

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Title: Socioeconomic and Environmental Factors Affecting House Rents in Islamabad

Abstract

Socioeconomic and environmental factors play an important role in determining the housing prices. This study investigates both socioeconomic and environmental factors that influence the rental price of housing in Islamabad. The primary data were collected by using the questionnaires through survey conducted in urban areas of Islamabad. Random sampling technique was used to collect data from 380 respondents. The Hedonic Price Model was applied to estimate the impact socioeconomic and environmental factors on house rental prices. The empirical results shows that Building characteristics like total covered area, total number of bathrooms, proper sewerage system, security system, total number of TV lounge, availability of lawn and availability of school, college public transportation, park, play ground in the vicinity, gas, water and electricity facility in house, Presence of trees in the house, balcony, garage, number of bedrooms, distance to the nearest hospital are all significant variables and have positive impact on house rents. All the above variables have positive impact on house rents. On the other hand age of the building, distance to the industry, distance to work place and number of floors has negative impact on house rents in Islamabad. Furthermore, the locational characteristics of the houses attract the lessee and it has significant impact on the rental price of the houses. Therefore the government should build small parks, lakes, streets and make a best sewerage system as well as extend the environmental services.

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Title: Economic Implications of Pesticide Residues in Mango's Export of Pakistan

Abstract

This study assesses pesticide residues in mango samples collected. It finds out pesticide residues in compliance with Joint FAO/WHO Codex Alimentarius Commission maximum residues limits (MRLs) for pesticide residues. This also evaluates the economic impact of sanitary and phytosanitary (SPS) measures (pesticide residues) on the Pakistan's mango export. The study used both primary and secondary data. Secondary data from 1990–2012 for mango production, domestic consumption, domestic price, FER, and export quantity were collected from Pakistan Economic Survey, Fruits and Condiments Statics of Pakistan, Agriculture Statistics of Pakistan, National Trade and Transport Facilitation Committee (NTTFC), and Food and Agricultural Organization Statistics (FAOSTAT, 2001). Whereas the Primary data of pesticide residues data was generated in Ecotoxicology Research Institute, National Agriculture Research Centre (NARC), Islamabad. Mango samples (primary data) were collected from orchards in Multan and Muzafargarh, the main mango growing areas in Pakistan. Data was analyzed through laboratory experiment and regression analysis. It was found that about 78% of the samples being analyzed were containing pesticide residues to varying levels out of which 67% were above the Codex Maximum Residual Limits (MRLs). Three pesticides viz. chlorpyrifos, endosulfan and profenofos were exceeding their MRLs. It has been observed that both domestic consumption and domestic price have significantly negative impact on export quantity of mango by a factor of 0.0017% and 0.00046% respectively. Moreover, every unit increase in mango production lead to 0.0017% increase in export quantity of mango. The co-efficient of FER was found as 0.021 showing that every one unit change in FER in the international market, the export quantity increases 0.021% in the same direction. It has also been observed that mango export is negatively impacted by SPS (Sanitary phyto-sanitary measures) measures. The results show that strict SPS measures are decreasing our trade. Although its coefficient is statistically insignificant this may be due to the relaxed regulations of the current importing countries. However, it can be argued that mango exports to EU countries will be more negatively influenced because of their stringent regulations. Therefore, Pakistan should improve food checking on priority basis, especially in bundles with exporters and promote Good Agriculture Practices (GAP). Pakistan must work seriously to qualify food safety and quality compliance demands. Establishing food testing standard and inquiry infrastructure on significance basis, especially in collaboration with exporters. Moreover, the exporters who target high value markets and seeks certifications like ISO 14000, EurepGAP, HACCP and ECO Labeling should be fully sponsored, at least for a specified period of time. Supervised by: Dr. Anwar Hussain



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Title: Changing Temperature, Electricity Consumption and Households' Coping Mechanisms against Electricity Shortfall in Islamabad, Pakistan

Abstract

This study analyzes the impact of changes in monthly temperature on the monthly residential electricity demand for the capital city of Pakistan, Islamabad. This study also analyzed the households coping mechanisms against electricity shortfall along with their monetary and environmental costs to the society in Islamabad. This study used the primary data from the monthly billing data from June 2012 to May 2013, from 250 respondents from the residential sector of the urban Islamabad. To analyze the impact of monthly temperature on residential electricity demand, this study used simple linear regression model and log linear regression model. The coping mechanisms against electricity shortfall that are using in the residential sector and their respected monetary and environmental costs are analyzed through survey and the structured questionnaire. Results of the study revealed that the changes in monthly average temperature has a significant and positive impact on the changes in the monthly electricity consumption. All the correlations and elasticities are positive and significant. The coping mechanisms that the households are using against electricity shortfall are the small electricity generators, solar energy systems, uninterruptible power supply systems (UPS) and rechargeable fans. From the monetary standpoint, all of the coping mechanisms bring retail costs while generators, UPS and rechargeable fans bring also the operational costs. From environmental point of view, all the coping mechanisms impose the environmental costs in terms of CO₂ emissions at the time of construction while generators impose the operational environmental costs also. It is concluded that electricity consumption increases in hot months in the residential sector and it decreases in winter with a decrease in the average atmospheric temperature. At the households level, most of the electricity is generated by small thermal generators which are bringing high monetary and environmental costs to the society. The authorities should discourage the use of generators by providing the households the required amount of electricity. New hydropower, solar power and wind power projects should be implemented. Nuclear power is also an option to minimize the gap between supply and demand for electricity.

Supervised by: Dr. Rehana Siddique



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Title: Effect of Climate Change on Sugarcane Yield in Pakistan: A District Level Analysis

Abstract

Climate change is one of the biggest confronting challenges to mankind. The impacts of the climate change have affected agriculture crop sector specifically. Many researchers attempted to compute the effect of climate change mainly on food crops since decades. Although, the estimation technique and construction of the variables were under the great debate and various researchers pointed out problems present in literatures. Therefore, serious attempts are required to estimate the climatic effects on other crop(s) with superior estimation technique and concrete method of variables construction based on strong theoretical background. This study estimated yield and acreage responsiveness of sugarcane crop to climate change in major sugarcane producing districts of Pakistan using fixed effect model and Arellano Bond GMM estimation technique. The results showed that sugarcane yield is more sensitive to precipitation at different phenological stages including germination, tillering and grand growth stages than temperature whereas the effect of agricultural production technology (0.087) was positive. Moreover, severe climatic incidents like drought showed negative impact (-0.024) on the crop yield. Therefore, abrupt changes in climatic condition adversely affected the crop production in Pakistan. Price and non-price factors were important determinants for sugarcane acreage allocation. The result showed that own -price of sugarcane had significant positive impact (0.149) on area allocation. However, the relative prices of substitute crops viz. cotton (-0.027), maize (-0.003) and wheat (-0.22) had negative impact on area allocation. It could be crucial to invest in Research and Development (R&D) for developing improved drought tolerant sugarcane varieties to minimize the risk of yield losses due to changes in climatic conditions in Pakistan.

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Title: Impact of Climate Change on Vegetables Production: The case of Potato, Onion and Chilies in Pakistan

Abstract

This study has been conducted to examine the impact of climate change and weather shocks on potato, onion and chilies productivity in Pakistan by employing the production function approach using the districts level data for the period of 1981-2010. Employing fixed effects model (FEM) and random effects model (REM) estimations on panel data, this study finds evidence for significant impact of climate variables on vegetable production. The impact differs across various phenological stages of the crops in magnitude as well as in direction. Extreme events like flood and drought cause significant reduction in selected vegetables productivity. The area under cultivation have significant role to increase the productivity except in chilies field in Sindh where it cause decreasing returns to scale. Additionally, technological innovations captured by time trend also play a significant role in enhancing the yield of crops except in Punjab in the field of onion where it has negative sign. Key words: agriculture, climate change, phonological stages, yield, districts level panel data.

Supervised by: Dr. Munir Ahmad



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Title: Impact of Weather Shocks on farmers' Livelihood in Rural Areas of District Multan, Punjab

Abstract

This study estimates the impact of weather changes on farm income in district Multan Punjab. The analysis is based on primary data collected from 273 farmers. Regression model and descriptive statistics were used for the analysis of the data. The weather shocks such as floods have significant adverse effect on farm income. Various socio-economic variables like age, education, family size, machinery ownership, and farm size and non-farm income also influence the farm income positively. Access to weather information is also a significant factor that positively contributes to farm income. The extent to which small holder farmers cope with weather extremities is very low and policy implications of study are conservation projects related to technical approaches, infrastructure improvement and access to credit. Diversification of income can reduce the risk of livelihood loss by spreading it across more than one income source. Education also plays important role related to adoption of agricultural practices offered by extension services.

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Title: The Impact of Financial Development on Co2 Emission: Evidence from Selected South Asian Countries

Abstract

This thesis intends to investigate the link between financial development and CO2 emission for selected South Asian countries. Furthermore, the study also investigates the validity of environmental Kuznets curve (EKC) in case of carbon dioxide emission. This study has used the Panel Fixed Effect Least Square as well as Random Effect technique over the Period of 1974 to 2013. The study results show that financial development has positive impact on CO2 emission in selected South Asian countries. Result also shows that that trade openness has negative impact on co2 emission while energy use and GDP per capita have positive impact on CO2 emission in selected countries. As far, EKC hypothesis is concerned; the result confirms the existence of (EKC) hypothesis in these selected South Asian countries. Interestingly, FDI has insignificant impact, so there is no role of FDI on CO2 emission in selected south Asian countries. On the other hand, estimation results based on random effect model show almost the same results that we get with fixed effect model. For example, just like the empirical results based on fixed effect model, random effect model too indicate that financial development has significantly positive impact on co2 emission. In the same manner, energy use and economic growth have positive impact on co2 emission. Finally the results confirm the EKC hypothesis but the coefficient of GDP square is not significant.

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Title: Determinants of Health and Healthcare Cost of Cement Workers and Community: A Case Study

Abstract

Health status determines the quality of life of workers and the community. This study analyzes the health protection program and the environmental impacts of cement plant on working conditions to find the frequency of occupational illnesses and associated health costs at a cement factory in Khyber Pukhtoon Khwa, Pakistan. Furthermore, this study analyzes the active factors that affect workers' health and measures to reduce the incidence. This study uses the primary data collected from the factory workers and members of neighboring community. The health protection program, incidence rate and occupational health cost has been estimated through descriptive measures along with statistical tests like chi-square test and student t-test. Logistic regression model results have been provided to stab the effects of active factors that affect workers' health and possible socioeconomic measures that can reduce incidence. Inhalation of health hazardous gases and cement dust causes severe health disorders in terms of pulmonary, cardiovascular and eye problems and imposing additional health cost on workers. The results also concluded that health protection program reduces the incidence rate and health expenditures.

Supervised by: Dr. Saqlain Raza

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Title: Environmental Impacts of Standard of Living: A Case Study of District Mardan, Khyber Pakhtunkhwa

Abstract

Household income plays an important role in the improvement of the standard of living. However as the standard of living of the household improves, it also causes environmental degradation. This study investigatesthe environmental impacts of living standard of the households in District Mardan. The impact of other factors such as household size, location of the household (urban or rural) and education of the households is also estimated. The study used primary data of 267 households collected through the questionnaire. The questionnaire consists of the information relevant to the households direct energy consumption and different socio-demographic information. The results are estimated through regression model. Findings show that household income is significant factor in increasing CO₂ emissions in District Mardan. A positive relationship is also found between household size, education and CO₂ emissions. Findings also reveal that EKC is valid in case of rural areas but not in urban areas because of the carbon intensive consumption activities of urban households. Hence an effective policy formulation stressing on public awareness programs, incentives of tax reductions, and better public transport network is conducive to the reduction of CO₂ emissions in the selected District.

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Title: The impact of climate change on groundwater resources in Upland Baluchistan

Abstract

Access to clean and sufficient amount of water is imperative for the substance of life on the earth and all economic and non-economic activities of human beings are heavily rely on it. In Pakistan water availability is always too little to fulfill the desirable level particularly in Baluchistan. So, this study has been undertaken as a case study for analyzing the impact of major climatic variables (temperature and rainfall) and non-climatic variables (number of tube wells, population density, cropped area, and number of dams along with its storage capacity) on decline ground water level in upland Baluchistan region of Pakistan. The study used balanced panel data from 1980 to 2013 drawn from Khair (2009) and different Government sources. The analysis has been made through applying fixed effect estimating technique. The results revealed that the effect of temperature, population density, cropped area and number of tube wells have significant positive impact on decline water table level. In addition, rainfall has negative and significant effect on decline water table level. The maintenance of healthy livelihood and the rooting out of poverty in Baluchistan is much dependent on groundwater. So, serious steps should be taken to rise and or maintain the groundwater level in Baluchistan. Certain policies should be made which not only focus on the increasing number of tube wells but also its side effects on environment. Dams should be constructed in such areas where the water storage is maximum. Farmer should be convinced to adopt water conservation techniques

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Title: The Impact of Financial Development and Energy Consumption on Environmental Degradation of Pakistan

Abstract

This study investigates the impact of financial development (Domestic Credit to Private Sector, Market Capitalization, Financial Deepening and Index of financial development), economic growth, energy consumption and trade openness on environmental degradation (CO₂ and CO_{2e} emission) of Pakistan. ARDL co-integration approach is applied over the time series data for the period of 1980 to 2012 to measure long-run and short-run relationship among variables. Zivot and Andrew (1992) structural break unit root is applied to estimate unit root in the presence of structural breaks in the series. Results confirm that all variables in all models are co-integrated. Our results suggest that only market capitalization reduce energy emission in long run. Economic growth, energy consumption and trade openness are the major contributor of energy emission in Pakistan. Our findings also confirm the existence of Environment Kuznets Curve in Pakistan. The reliability of the results is confirmed after the implication of all stability tests.

Supervised by: Dr. Hafsa Hina

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Title: Impact of Climate Change on Maize Yield in Pakistan: A District Level Analysis

Abstract

The current study examines the yield and acreage responsiveness of maize crop to change in climatic condition using fixed effect model (FE) and Arellano Bond GMM estimation technique respectively. The results are suggestive that maize yield is sensitive to precipitation at vegetative stage in spring and at reproductive stage in autumn season in Pakistan. Yield of the crop is found to be more sensitive to temperature as compared to precipitation. The abrupt changes in weather conditions (weather shocks) adversely affect yield of maize in Pakistan. The results show that own-price of maize crop has significant positive impact on acreage allocation of the crop while prices of substituted crops have negative impact on acreage. Fertilizer prices also effect acreage allocation of maize crop. Change in precipitation at vegetative stage of spring maize has significant positive impact on area allocation while change in temperature at reproductive stage of spring maize have negative impact on acreage.

Supervised by: Dr. Muhammad Iqbal



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Title: Impact of Corruption and Income Inequality on Environmental Degradation: An Analysis of Selected South Asian and East Asian Countries

Abstract

The present study has investigated the impact of corruption and income inequality on environmental degradation, in selected South Asian (Pakistan, India, Bangladesh, Srilanka) and East Asian (China, South Korea, Japan, Malaysia) countries for the period of 1984-2012. CO₂ emissions has been taken as indicator of environmental degradation. The research has applied the panel co-integration techniques for analyzing both the long run and short run relationship. Using Im, Pesaran and Shin (IPS) (2003), the results indicate that all the variables are integrated of order one. After this, Pedroni (1999) test detected co-integration among all the variables of the study. The study has estimated the long run relationship through Dynamic Ordinary Least Square (DOLS) test. The results indicate that the Environment Kuznets curve hypothesis exists for both South Asian and East Asian regions in the long run, whereas corruption and income inequality are positively associated with CO₂ emissions. Finally, Error correction mechanism for panel study is applied on the basic and augmented EKC models. Short run results suggest that Environmental Kuznets curve hypothesis holds in South Asia even in the short run, and corruption and income inequality are found to have positive impact on CO₂ emissions. EKC is not proved for East Asia in short run and all other explanatory variables including corruption and income inequality have insignificant impact on CO₂ emissions except per capita energy consumption. Moreover, corruption and income inequality delay the turning point of EKC in both regions. According to the ECM result, disequilibrium in CO₂ emissions within a year is corrected by 14 percent for South Asia and 26 percent for East Asia. Overall, the results indicate that the impact of corruption and income inequality on CO₂ emissions is high in South Asia, as compare to East Asia.

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Title: Household's Willingness to Pay for Safe Drinking Water and Improved Sanitation and Waste Management: A Case Study of Kohat

Abstract

Environmental problems are growing across the globe and are prevailing in Pakistan. There are number of problems linked to it, with associated diseases being the primary problem, followed by scarcity of clean and pure drinking water, proper sanitation and solid waste management. In this study survey data has been constructed from the city of Kohat. Contingent valuation method (CVM) was been used based on which logistic regression model has been estimated to find determinants for willingness to pay for water and waste management in District Kohat. Results indicated significance of education, family size and satisfaction level for water. Income also used to play a significant role in household's willingness to pay for water. Similarly income, education and family size are found to be significant in relationship with willingness to pay for waste and sanitation. Both income and education were found to play a vital and significant role in determining respondent's willingness to pay for waste management and sanitation. Based on these findings government can play vital role by initiating educational campaigns following different programs. Further from municipality to higher authorities there is need for storage facilities to avoid usage of unhygienic water for drinking purpose and other day to day usage with increased time for supply.

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Title: Yield and Acreage Responsiveness of Chickpea to Climate Change in Pakistan: A District Level Analysis

Abstract

The geographical location of Pakistan is such that it is vulnerable to climatic changes; it is these changes that are an emerging issue in terms of agricultural production. Climate change is the result of increase in the concentration of greenhouse gases (GHGs). It happens such that these gases trap the sunlight and increase the earth's overall temperature. This change is altering the yield levels of crops and these effects vary across various types of crops, as the increase in temperature and precipitation agricultural productivity is affected. The current study looks at the impact of climate change on chickpea yield which is the main pulse crop of Pakistan. This research uses fixed effect model to evaluate the yield responsiveness of chickpea to climate change and Arellano Bond GMM estimation technique to estimate the acreage response to climate change. The data used in this study is the annual data for the period 1981 to 2010 pertaining to 15 major chickpea producing districts of Pakistan. The results are suggestive that chickpea yield is more sensitive to precipitation at different phenological stages than temperature. The study found that temperature has positive but insignificant effect on yield of chickpea crop whereas rise in temperature during the flowering/pod setting and maturity stages reduces acreage allocation to chickpea production. The results of estimation reveal that climate change may influence the yield and acreage of chickpea in Pakistan. Therefore, appropriate adaptive and mitigating techniques as well as measures like timely cultivation, better irrigation system and new technology are recommended to cope with or at least to reduce the adverse impact of this newly emerging hazard of global climate change on chickpea yield in Pakistan. Supervised by: Dr. Muhammad Iqbal



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Title: Natural Disasters and Economic Growth in Pakistan: An Enquiry of Floods Related Fatalities' Triad

Abstract

Voluminous work has been produced on natural disasters and economic growth nexus but studies dealing specifically floods related fatalities and economic growth linkages are scant and this is particularly true for Pakistan. Present study is an attempt to investigate the determinants of the magnitude of floods related fatalities and to gauge impact thereof on GDP per capita growth of Pakistan by employing „Two Stage Least Square (2SLS)“ technique on time series data from 1972-2013. Unlike previous work, this study considers three dimensions of calamity namely floods-affected people, floods related mortalities and damages done by the floods in totality while gauging the impact. This study finds that floods related fatalities have significant negative impact on GDP per capita growth of the economy. The strongest impact is observed for the monetary damages done by the floods. GDP per capita growth and effects of disaster management authorities are found reducing impact of floods through floods-related fatalities suggesting that higher income is enabling the government by increasing financial resources to do investment in floods resistance measures. Most importantly, floods frequency (FF) has a robust positive impact to determine the floods related fatalities suggesting lack of learning from the past floods events. Based on the findings, in general, this work recommends taking both structural and non-structural floods mitigation measures particularly in these regions that are located in floods plain areas. By highlighting some of the findings, we identify research areas of interest for future work.

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Title: Foreign Aid, Government Stability and Environmental Degradation: An Analysis of Selected Developing Countries

Abstract

This study has been conducted with an objective to explore the impact of foreign aid and government stability on environmental degradation in selected developing countries by establishing three categories. The first category of countries comprises Bangladesh, Ethiopia, Kenya and Zimbabwe; the second category comprises middle income countries like India, Indonesia, Nigeria and Pakistan while the third category contains upper middle income countries including Brazil, China, Turkey and Thailand. The two stage linear regression analysis panel data technique was applied by using the data from 1996 to 2010 to check that how foreign aid and government stability effect the environmental degradation. This study has used three different indicators of environmental degradation that are CO₂, SO₂ and PM10. The individual effect of all these variables have been checked separately by using different instruments TSLS approach while the combined effect have been checked by developing pollution index through PCA, in pollution index environmental variables(CO₂, SO₂ and PM10) have been used simultaneously. The findings of this research demonstrate that foreign aid and government stability has positive and significant impact on environment in low, middle and upper middle income countries. Furthermore, the study finds the empirical evidence that if foreign aid is conditioned with the government stability in the aid recipient country then environmental standards can be achieved .The results of present study favor the theory that foreign aid and government stability is helpful in the preservation of environment.

Supervised by: Dr. Shuaat Farooq



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Title: The Role of Solar Energy Improving the Livelihood of Rural Household: A Case Study of Dajaur Agency

Abstract

The study was conducted in a remote village of Bajaur agency where no electricity was available and about two years back a non-government organization provided solar system to each household. The research aimed to investigate the socioeconomic and environmental changes occurred after the installation of the solar home system. This could affect the different capitals of livelihood. Using a recall method, household survey was conducted for collected primary data through questionnaire and focus group discussion. The data was analyzed through simple bivariate regression model as well as through descriptive statistics. The results revealed that the solar system has provided direct and indirect benefit to the surveyed households. The study hours of the student were getting improved. The consumption of kerosene oil and LPG which used for lighting have completely overcome, resulted in less indoor pollution and more saving due to cut of the expenditure on these resources. The impact on business activates was negligible, however it added a little bit to the income because of the extended working hours at evening. Information and communication appliances along with other electrical equipment were found which not available before the installation. There was significant improvement in social activates which were earlier limited to day time. It can be concluded that the solar system has improved the livelihood capitals of the rural households and it is available system and should be extended to such other remote communities.

Supervised by: Dr. Usman Mustafa

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Title: Adaptation to Climate Change and cotton Productivity: A Microeconomic Analysis

Abstract

Climate Change is one of the growing and a severe concern that covers all the challenges that are being faced by the human being. Specifically the agriculture sector is affected through the climate change. There is lot of literature on the effect of climate change on agriculture crops, estimation techniques were under great debate and many researchers pointed out the problems present in literature. This study used Climate Change Impact Survey 2013 (CCIS,2013) data collected by Pakistan Institute of Development Economics and applied the Heckman Type Treatment Effect Model to investigate the impact of selected adaptation strategies adopted by cotton growers in isolation and portfolio (combination of two or more) on net revenue gained from cotton production in Pakistan. The implemented strategy input intensification (S-3) has a positive and significant impact on net revenue if adapted as isolated or as a part of combination. Amongst all observed beneficial strategies, those farmers who are found adopting input intensification stand-alone (S-3) are gaining more profits as compared to other strategy adapters. The result shows that the impact of temperature and precipitation depends upon the Phenological stage of cotton crop. There are four stages of cotton crop according to growth namely sowing and germination stage, vegetative stage, flowering and fruit formation stage and last one is boll opening stage. The overall effect of temperature on cotton is positive but impact of precipitation on yield of cotton varies according to growth stage. The results found that land fertility, education, age, land ownership, loan, sources of information and family size are determinants of selection of various adaptation strategies.

Supervised: Dr. Muhammad Iqbal



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Title: Responsiveness of Fruit Acreage and Yield to Climate Change in Pakistan: A District Level Analysis

Abstract

This study investigates the impacts of climate change on productivity and acreage response of citrus and mango fruits to change in climatic factors using data regarding 12 major citrus growing districts and 14 mango growing districts of Pakistan for the year 1980-2010. Fixed Effects Model has been employed to estimate the relationship between climatic factors (i.e. temperature, precipitation) and yield of mango and citrus fruits. Dynamics GMM has been executed to investigate acreage responses of aforementioned fruits. The trends of long run norms of temperature and precipitation are indicative that the climatic variables have observed changes during different stages of fruit growth. The findings of the study are indicative that climatic factors have significant impacts on productivity of citrus and mango fruits in Pakistan. Increase in norm of average temperature during different phenological stages of fruits growth affect citrus productivity in non-linear fashion (with negative linear term). However, insignificant impact of increase in temperature was observed in case of mango productivity. The effects of precipitation on fruit productivity during fruit growth in case of citrus and maturity stage in case of mango were also found significant. The results from dynamic GMM are suggestive that climate factors affect acreage responses insignificantly and differently across various phenological stages of the fruits. Moreover, control variables such as own prices, lag of cultivated area, road infrastructure (road length in KM), and transportation (number of pickups available in district) have positive and significant impacts on productivity and acreage responses of both fruits (mango and citrus).

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Title: Impact of adaptation to climate change on Rice Productivity and Efficiency: Application of Stochastic Frontier

Abstract

The paramount aim of this study is to explore the influences of adaptations to climate change on farm income in rice-wheat zone. The study takes the sample of 643 farmers from Climate Change Impact Survey (CCIS, 2013) conducted by PIDE with the collaboration of IDRC. This sample contains three districts of rice-wheat zone i.e. Sialkot, Hafiz Abad (Punjab), and Larkana (Sindh). For empirical purpose, Endogenous Switching Treatment Effect Model (ESTEM) has been used to obtain counterfactual analysis as well. The results of the study are suggestive that adaptations have positive and significant impacts on farm income. Adapters are found beneficiaries in most of the strategies than non-adapters whereas counterfactual indicates that if adapters become non-adapters, they are bearing loss and conceding lower returns as compare to being remained adapters. Furthermore, education, access to credit market, and saving, and climatic variables such as long run averages of temperature and precipitations are found having significant impacts on farm income. The results obtained from treatment equations are suggestive that education, experience, social networking, and government extensions are found important determinants of decision to adapt climate changes.

Supervised by: Dr. Munir Ahmad

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Title: Socio-economic and Environmental Factors Affecting Health in District Bhimber (AJK)

Abstract

This study evaluates the impact of various socio economic and environmental variables on the incidence of diseases in district Bhimber AJK. The diseases selected were diarrhea, dysentery, cholera, typhoid, bronchitis, pneumonia, asthma and malaria. In this study I used primary data collected through questionnaire from 267 randomly selected households. Analysis has been made through applying logistic regression. The results revealed that incidence of water borne diseases decreases with the increase in income, education, use of piped or motor pump water, satisfaction from water quality, drinking water treatment practices, and hand wash facility near the toilet, availability of toilet in the house and frequency of toilet clean. Whereas water source outside the home, sewerage water drainage in open drains, Food storage in open jars/utensils, shows significant positive relationship with water borne diseases. Similarly, cooking in multipurpose room, use of wood and animal dung as cooking fuel, smoking, have significant positive impact on incidence of air borne diseases. Whereas cooking practice in open air, room space, presence of chimney at cooking place and ventilator have negative relationship with air borne diseases. Fly door, fly window and preventive measures from mosquitos other than mosquito net show negative link with the incidence of malaria. While sewerage water drainage in open drains, presence of garbage heaps and stagnant water near a house and water storage in open container have significant positive effect on the incidence of malaria disease. The study suggest that emphasis be placed upon awareness regarding health, improvement of sanitation conditions, introduction of hygienic practices, modern fuels like LPG and bio-gas for better health.

Supervised by: Dr. Anwar Hussain



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Title: Cost Benefit Analysis of Environmental Quality Improvement Project.

Abstract

The contingent Valuation CVM is used to find the household's willingness to pay for a water supply system improvement in Kallar Kahar valley, Pakistan. About in person interviews of random sample of 201 Households are conducted in Kallar Kahar Tehsil of Chakwal. The data that was used in this study for measuring willingness to pay of 201 respondents was purely cross sectional data. The resident of the Kallar Kahar valley were asked about their willingness to pay for developed water. The willingness to pay of the people was asked keeping in view of their monthly income and expenditure.

Households are looking for consistent and purifying water service from Municipal Corporation of Kallar Kahar which is the main body for drinking water supply in Kallar Kahar Valley. Assuming that if the water problem is solved in 2020 with developed water filtration system, then how much the residents of Kallar Kahar will be willing to pay for improved water services? Our results find that the averages Willingness to pay of the households were Rs.176 for the developed water filtration system. According to my research Kallar Kahar is facing huge shortage of safe drinking water per day. Its shows that households are desperately looking for option of consistent water supply service as compared to present system which are water from well, water tank, tube well, tankers, etc.

Supervised by: Dr. Karim Khan



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Title: Pollution Havens or Factor Endowment an Enigma: A Case of Agriculture Sector

Abstract

This paper investigates the pattern of trade for agriculture sector using dataset of 20 countries (developed and developing) from 1980-2011 using decomposition method. This method is helpful in analyzing how different economic factor effect the agriculture sector while “decomposing the impact on pollution into “Scale, Composition and Technique effects”. Scale variable used in analysis is the Agricultural output to its overall agricultural land, Composition comprises of the Capital to Physical labor ratio, and for Technique Research & Development Expenditures in Agriculture sector is used as Proxy. This variable is the key variable to finding the pattern of trade. With high level of Research Expenditures leads to increase in income level hence it will be useful to determine the pattern of trade difference among the developed and developing countries. The papers finds that “Pollution Havens” do determine the pattern of trade but also shows that investment by corporate firms in developing countries are using clean technologies hence reducing the level of pollution in these developing countries in agriculture sector. And with Trade intensity pollution concentration are reduced in the agricultural sector thus is beneficial to the environment. Supervised by: Dr. Rehana Siddiqui



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Title: Seasonal Climate Forecast and Farmer's Adaptation Behavior: Case study of tehsil Athara Hazari, District Jhang, Punjab

Abstract

Sustainability of agriculture sector is indispensable. From a beggar to duke, everyone shall need something to stuff their bellies. It has to continue in this manner till the doom's day. Productivity of agriculture is at risk because of climate variability. Therefore there is a need to cope with these changing scenarios of climate. Solution lies in reduction of factors that cause climate variability and in adjusting the usual farming practices with the climate phenomena. This study proposes adjustment strategies to cope up with the climate variability through adaptation. Adaptation can be implemented through acquiring information of seasonal variability. Seasonal Climate Forecast (SCF) before the sowing season is indispensable for the modern day farming. The suggested channel for dissemination of information regarding SCF is an agriculture extension worker. Accuracy of this probabilistic information can never be ignored. On the basis of technological advancements in metrological sciences, authenticity and accuracy of information is improving day by day in this sector. Another very important factor to truly benefit from adaptation is the correct interpretation of SCF. An extension worker can be very effective in this regard. He can correctly evaluate farmer's adaptability behavior regarding this phenomenon. Tehsil Athara Hazari, District Jhang, Punjab has been selected for this specific study. A total of 267 respondents have been selected for their behavioral analysis. Other tools of study include descriptive statistics, cross tabulations, bar charts, logit and linear models. Results show that farmers want to incorporate this probabilistic forecasted information in their decisions regarding farming practices. Farmers' seriousness regarding SCF has been examined through their willingness to pay against the dissemination of this information to them at village level. On an average Rs. 95 per household is willing to pay (WTP) for the services of extension worker. About 79 percent of the respondents are WTP for services of extension worker and 88 percent of the respondents are ready to change their farm cropping decisions. According to results farmers are expecting increase in their crop productivity on an average of 6.8 maund per acre. Hence it can be concluded that farmers are willing to pay, willing to change their cropping decisions, willing to adopt new techniques. Only thing is required i.e. policy makers should consider it in their policies.

Supervised by: Dr. Rehana Siddiqui

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Title: Analysis of the Ecological Efficiency and its influencing factors

Abstract

This study aims to analyze the relative position of each developing country, in terms of ecological efficiency and effect of many influencing factors on it. Ecological efficiency (Relative Resource Intensity) was calculated in terms of ecological footprint per unit of GDP, and its cross national variation is analyzed. The Stochastic Impact by Regression on Population, Affluence and Technology (STIRPAT) model was used as an analytical tool to examine the effect of different influencing factors on relative resource intensity, using the cross section data of 91 developing nations for the year 2011 and weighted least square regression analysis. The data on Ecological Footprints was obtained from Global Footprint Network. The analysis shows that the coefficient of the linear term of GDP per capita is positive and quadratic term of GDP per capita is negative and thus cross national EKC relationship between relative resource intensity (EF/GDP) as the indicator of environmental degradation and the level of economic development holds with the turning point at around US\$ 7663. This finding suggests that relative resource intensity is lower for more affluent nations. But, variation in the resource intensity is lower at the higher affluence level, suggesting lesser potential for further improvement in ecological efficiency performance. Industrialization has a negative but insignificant effect on relative resource intensity, indicating that structural shift in developing countries don't significantly improves the ecological efficiency. And coefficient of Population density is negative and significant. Whereas, dummy variable indicating the latitude shows positive impact on the relative resource intensity if the nations are located in arctic regions and colder climate and negative impact on the relative resource intensity for tropical nations. Overall the findings suggest that eco-efficiency is higher in more affluent developing nations but economic development and structural shift in the developing nations is insufficient to achieve sustainability and may leads to the higher environmental burden.

Supervised by: Dr. Anwar Hussain



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Title: Economic and Environmental Costs of Tourism: Evidences From District Abbottabad

Abstract

Tourism plays an important role in the expansion of a country's economy but it is also strongly linked with environment. The linkage of tourism with environment is complex as much worse impacts are attached with tourism related activities. This study inspects the economic and environmental cost related with tourism and its impacts on local residents in the district Abbottabad, Khyber Pakhtunkhwa, Pakistan. Primary as well as secondary data is used. The responses of respondents including local residents, tourists, hotel managers and shopkeepers associated with economic and environmental costs are being captured via Questionnaires and interviews. It is found that tourism affects, in terms of increase in traffic congestion, prices of good, littering and noise pollution. It is recommended that tourism can contribute in environmental conservation, if element of sustainability is included in planning and management process. Supervised by: Dr. Anwar Hussain



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Title: The Role of Environmental Amenities in Determining Housing Prices, a Hedonic Price Analysis

Abstract

The current study attempts to (non-market valuation) use Hedonic pricing method so as to model the relationship between rental price of a house and housing attributes. This study estimates that a change in certain attribute affects the house rental price. Using hedonic model the relative monetary contribution of each factor is estimated. The mode of identification was through literature search, questionnaires and interviews conducted with selected households in the city Mirpur Azad Kashmir. From these attributes, critical house value influencing variables were chosen for statistical analysis. Sample of 266 houses was used from Mirpur Azad Kashmir. Each sample unit (house) was inspected and properly identified to obtain information on its imputed rental price of property. The structural characteristics for property, neighbourhood characteristics for property and environmental characteristics for property were then used to develop a hedonic model against the dependent variable (rental price). The results show that a number of variables (like Plot size, age of house, number of floors, number of rooms, attach bath with each room, hospitals, commercial centres, public parks, tree plantation in streets etc.) have significant impact on house rental prices. The study thus enhances objectivity, accuracy and efficiency in Environmental valuations.

Supervised by Dr. Iftikhar Ahmad



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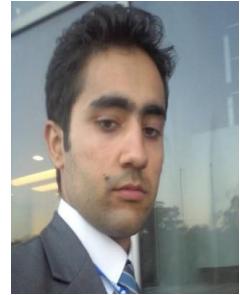
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Title: Impact of Leather Tanneries on Household Health and Willingness to Pay for Clean Water Supply in Sialkot, Pakistan

Abstract

Water borne diseases due to contaminated water remain a serious problem in most of the developing world, although it consumes a larger portion of municipal budgets. The situation is serious in Sialkot district of Pakistan where ground water is contaminated due to improper disposal of their effluents waste water. The current study was designed to find the determinants of willingness to pay (WTP) by households for clean water supply and major causes of major water borne diseases in the affected area. A contingent valuation survey approach and a stratified random sampling technique was applied. Sample size consists of two hundred sixty nine respondents. A double bounded dichotomous choice questions followed by an open ended question format was used to elicit WTP and maximum willingness of the respondents for clean water supply. Logit and Multiple Linear Regression Model is used as econometric tool to analyze the data. The results reveal that as income increases percent of the total respondents WTP increase, while multiple regression reveals a monthly mean WTP of Rs. 234.54 which is greatly affected by age, household income, education and environmental awareness i.e. respondents with higher household income and higher level of education are more WTP. Residents who are living closer to the tanneries are more affected and their WTP was higher.

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Title: Household Awareness and Willingness for Better Solid Waste Management: A Case Study of Quetta

Abstract

Sustainable management of solid waste is a challenging task. Developing countries are consuming significant portion of their budget on Municipal services including waste disposal to tackle problems in proper way so as to conserve environment and human health. However, looking at the scale of the job, government alone cannot find sustainable solution to the problem. Hence households are required to play a role and this study determines willingness to pay and environmental awareness of households for better solid waste management in Quetta city. Contingent Valuation Method (CVM) was used to project household willingness to pay for better management of waste. The stratified random sampling technique was used to get 260 household observations from two union councils including one from Zarghoon and another from Chiltan town. The objective of the study was to examine awareness level that prevailed among households as well as household's demand for waste collection services. Probit model was applied to estimate determinants of willingness to pay and environmental awareness of households. It was found that about 63% respondents were willing to pay an average amount of Rs 227 per month for proper management of waste. The awareness about the waste problem and its prevention was found to be present in 68% of the total respondents. Education is the most influential factor that determined environmental awareness, which itself is the main factor to influence Maximum willingness to pay for better waste collection services. The percentage of participants those were not willing to pay appeared to be less as compared to the percentage of participants who were willing to pay for better solid waste management. Hence, if the government provides people with better solid waste management services, there is a potential for revenue generation that will lessen the cost of waste. Supervised by Dr. Iftikhar Ahmad

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Title: Environmental Violations and Capita Markets Nexus: A Case of Pakistani Stock Market

Abstract

The objective of the research study was to assess the impact of the environmental disclosure negative news on company's returns, such as violation of permits, oil spills, and Environmental pollution Waste water pollution Air and Noise pollution Section Under (2,4,5 & 16) on the company's profitability (abnormal returns). Different techniques are suitable to measure the impact of the event on the company's profitability for instance Regression Analysis, Simultaneous Equation, Wilcoxon Test, and Event Methodology. But we applied event methodology, due to certain advantages and aptness. As it is for short run analysis. The data was collected from the cluster industry of Faisalabad city. Data was collected from the different resources including Violation list we got from the Punjab environmental protection agency and stock prices data we got from the Karachi stock exchange and from different channels. Data from daily stock prices of companies was used. Overall 384 companies were contacted. The data was collected from year 2003 to 2015. Panel data we used in which two categories created consisting of "companies data" fall under cross sectional sections and daily stock prices data fall under section time series section. As a concluded remarks it companies gives the mixed results however most of the companies has experienced the declining trend in its returns when the company violated the environment laws. As a policy recommendation government should make strong enforcement of environmental rules and regulation. Must should headed it. Make awareness of environment at community level. Programs like Ecowatch and Prokash which supported by Indian and Singaporean Governments. Companies that violate environmental laws should be heavily fined as well as tax.

Supervised by: Dr. Aneel Salman



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Title: Climate change and Milk Production: Evidence from Rural Pakistan

Abstract

Climate change is the major threat and big challenge to mankind. The change in climate not only affects the crops sector, but livestock sector is also affected by the climate change. In Pakistan, the most of research is undertaken regarding impact of climate change on crops sector and little attention has been paid to examine its impact on livestock sector. Therefore, the main objective of this research is to study the impact of climate change as well as farmers' membership of the projects [Special Program on Food Security (SPFS) and Crop Maximization Program (CMP)] on milk yield in rural Pakistan. Study uses household survey data for 322 farmers who were involved in crop as well as livestock production activities in the project area. The results are suggestive that precipitation has a non-linear (U shaped relationship) with milk yield. Similarly, temperature also is related to milk yield in similar fashion (U shaped relationship).the variable like value of milking animal, use of concentrates, use of catalysts, and green fodder acreage per animal (adult unit) have significant and positive impact on milk yield. The number of lactation months is found adversely related to milk yield. Age and education of head household, and credit availability to farmers turned out to be important determinants of project membership status of the farmers. The results are indicative that farmers' participation the project had insignificants effect on milk yield.

Supervised by: Dr. Muhammad Iqbal

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Title: Determinants of Hotels' Prices: A Case Study of Selected Hotels in Islamabad and Rawalpindi

Abstract

This study estimates the impact of various influencing factors on the room rates of hotels in Islamabad and Rawalpindi. I applied hedonic pricing model and used panel data obtained from 20 hotels for the time period 2010 to 2015, through questionnaire. I used random effect model. The results show that the star rating, availability of shuttle bus service within and outside the city, star, gym, security guards, hotel location, online reservation, presence of garden, hot tub and cafe have significant impact on hotel room rates. Online reservations, hotel located within city center and distance from airport have negative relationship with hotel room rates. Assessment of the relative importance of hotel attributes will escape investors and hotel managers from extravagant on insignificant attributes this will enhance their revenues. The hotel owner should give priority to the security related attributes for customer's satisfaction.

Supervised by: Dr. Anwar Hussain

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Title: Analyzing the Impact of Dust Pollution on Worker's Health in Textile Industry, Faisalabad, Pakistan

Abstract

This study estimated the impact of the dust pollution on workers' health and cost of illness in the textile industry of the Faisalabad. The cost of illness is the sum of the workday cost and cost of the medication. This was the cross sectional study conducted among the 200 randomly selected textile workers. This study estimated the both health and opportunity cost of textile workers by using the structural equation model (SEM) with observed and latent variables. Study used the confirmatory factor analysis (CFA) to interlink the latent factor diseases with their indicators symptoms. The results of the SEM model on age, respiratory diseases, overtime work, duration of employment, use of masks, and dust level are significant. Study finds that 62% workers bear the cost of illness and 43% workers miss the work last two weeks. The 69 % workers reported that due to the illness their work performance in industry is not normal, they suffered the problems during the work such as muscle aches, asthma, cough, respiratory allergy etc. Study also measured the prevalence of the respiratory diseases among the textile workers. Study revealed that 35.5% workers had wheezing, 65.5% phlegm, 58% chest tightness, 72% had a throat irritation problems. Study concluded that there is a high prevalence of respiratory diseases among the textile workers due to the exposure of dust pollution. Study also concluded that if successfully reduction in dust pollution occurs in textile industry; the worker will gain the benefits in term of the reduction in medical cost and gain in terms of wages.

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Title: Economic and Environmental Costs and Benefits of Paper -Mulberry: A Case Study of Islamabad

Abstract

Pollen allergy is a major issue for the residents of Islamabad. This study aims to find out the economic and environmental cost of paper mulberry and its alternative plants. This study further assesses the impact of pollen on human health. The study is based on primary and secondary data. Primary data was collected through structured questionnaire and secondary data was taken from Pakistan Meteorological Department (PMD). For estimating the impact of pollen allergy on human health, this study used simple descriptive statistics. The finding shows that children and male are more affected by pollen allergy compared to other gender. The affectees of pollen allergy are higher in the age group of (0-15) years which is 32 percent of the total affectees. The frequency of the age group 40 plus is low as compared to other age groups. The number of allergy patients increases in the months February to April which is also in line with official statistics of the higher pollen count in these months. The average cost that was paid by each patient was Rs. 450 per month with maximum cost Rs. 2203, and minimum cost was Rs. 70. The Pine Rexburg (Clear) tree has showed maximum monetary benefits as against Paper mulberry which yields lowest benefits. For this purpose the Government should launch awareness campaign in the study area. Free of cost treatment should be given to the pollen patients. The government should take steps to remove the most allergenic/pollen produce plants from the cities. So the health cost may reduce in the study area. The cost-benefit analysis shows that Pine Rexburg and Kachnar are the best alternative to Paper Mulberry; therefore plantation of these tree species should be encouraged.

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Title: Impact of Air Pollution from Marble Industry on Health: A Case Study from Bajaur Agency, FATA

Abstract

The present research work is based on assessment of impact of marble industries on human health and duration of workday's loss due to the sufferings from different diseases. Primary data was collected using both probabilistic and non-probabilistic sampling techniques. The total sample size is 346 respondents. The data was equally distributed among marble factory workers and non-marble factory workers i.e. 173 from marble industry workers and 173 non-marble industry workers from residential area near the vicinity of marble industries. Data was obtained through well-structured, pretested questionnaire. Multiple linear regression model (MLR) was used to estimate both number of workday's loss due to illness and total direct mitigation cost. Result revealed that there is significant number of workday's loss due to illness from dust. High correlation was observed between higher working hours and greater exposure to the dust particles. Marble factory workers are more exposed to the dust. Thus making them more ill compared to non-marble factory workers and results in more workday's losses as compared to the non-marble factory workers. Non-marble factory workers have option to live within limits of the factory or far away from the factory and would also use air cleaning machines or dust minimizing appliances. Negative and insignificant relationship of income with workday's loss have been found. The respondents were unaware about the adverse effects of marble dust on their health. This is mainly due to lack of education and awareness. On an average the marble factory workers were losing 30% of their working hours and 37% of their income due to health hazards. Policy recommendations were formulated.

Supervised by: Dr. Usman Mustafa



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Title: Electricity as an alternative to fuel wood and its impact on deforestation. A Case study of Tehsil Ishkoman, Gilgit Baltistan

Abstract

Dependence on firewood as a major source of energy for cooking and heating results in deforestation and tehsil Ishkoman, in this regard is no exception. The present study aims to investigate, how provision of electricity as an alternative to firewood will impact deforestation with reference to the study area. Primary survey data of 250 households was carried out in this regard. The methodology used in this study is Descriptive statistics, Cost and Benefit analysis and Contingent valuation to capture willingness to pay. The results show that almost 100 percent of the respondents are using firewood as a major source of energy for heating and cooking purposes due to unavailability of other sources of energy. On average each household consumes 9.7 tons of firewood per year. Each household spends four and half hours for a single firewood collection trip and majority of the households collect firewood twice per week. More than 85 percent of the respondents are willing to replace existing energy source with alternative source (electricity) and their maximum willingness to pay (MWTP) is more than four times as compared to their existing electricity bills. Provision of electricity as an alternative energy source will not only reduce deforestation but also help in poverty reduction in the study area. On the basis of these results government should devise policies for such areas.

Supervised by: Dr. Rehana Siddiqui



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Title: Treatment of wastewater through Constructed Wetlands

Abstract

Pakistan is a country with a population of 185 million people. Almost 26 percent of the total vegetable is being irrigated through untreated wastewater. Wastewater irrigation poses many health hazards to humans and other grazing animals. Rising population and depleting per capita water availability accentuate the need to treat wastewater before its re-use to meet the need of growing food requirement. Study aims at finding the best suitable method of treating urban wastewater keeping in view the dynamics of Pakistan and site specificity of the Twin-Cities of Rawalpindi and Islamabad. Two widely adopted wastewater treatment techniques namely Sequence Batch Reactor (SBR) and Constructed Wetland (CWT) have been compared and a cost and benefit analysis is done on the basis of construction and operating costs, operative efficiencies and effectiveness. Moreover, impacts of wastewater on the yield of three major crops of Pakistan including wheat, rice and sugarcane have been simulated. Primary data is used for all comparisons and related analysis. On the basis of the findings it can be confidently said that CWT is more cost effective, both in terms of construction and operating costs, when compared with SBR thus making it more suitable for an energy deficient country like Pakistan. Per gallon cost of treated wastewater is much lower in case of CWT. SBR, on the other hand, has a slight edge over CWT in terms of effectiveness. Treated wastewater has a positive effect on crop yield.

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Title: Recreational Value and Willingness To Pay For Tourist Site: Evidence From Kalam District, Swat

Abstract: This study, which is among the first in swat valley to value the recreational benefits, estimate the recreational value (benefits) of the Kalam, Swat and find out the responsible factor that affects the visitors' willingness to pay (WTP). To investigate the desirable changes for increase in the recreational benefits of the site using primary data and applied individual travel cost analysis. The study examined that almost 98 % of the visitors to Kalam valley are willing to pay for further improvements and maintaining the site, in which about 37 % of the total respondents are willing to pay PKRS 100 to visit and enjoy the site. There can be considerable revenue, as the total annual consumer surplus or the economic benefit obtained from the recreation in Kalam is approximately Rs.421 million. Various factors influence the number of visits to the site, these includes travel cost, residence of the visitor, gender and quality of the site. However, quality of the site was also expressed as good by as 59.8 % of the visitors. The study recommends improvements in road, construction of safe parking, fun lands and camping sit at Mahodhand Lake. Moreover, the study suggests introducing an entry fee of Rs. 100 based on willing to pay. All the collected money has to be utilized for sustaining the resources.

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Title: Hotel Industry And Environmental Laws: A Case Study Of Selected Restaurants In Islamabad

Abstract: Although hospitality industry is an important sector providing comfort to the customers in the form of shelter, food and refreshment but the operations of the hotel also impact environment in many ways like CO₂ emissions, water pollution and waste generated. In Pakistan hospitality industry is growing and flourishing and it is the need of time to assess the adoption of the Hotels and Restaurant Act 1997 followed by customers' willingness to pay for green foods. The present study examined the customer's willingness to pay for standard food items (Pakistani, Chinese, Continental & Seafood) and also assessed the adoption of Hotels and restaurant Act 1997 in Islamabad. Besides, the impact of monitoring on the revenues of restaurants was also estimated. For this purpose, primary data had been collected from managers and kitchen staff of 35 restaurants and 400 customers through questionnaires in Islamabad. The findings of the study revealed that cleanliness and quality of service, education, income of customers have positive relationship with customer's willingness to pay (CWTP) for standard food item but noisy location of restaurant has negative relation with CWTP. The revenue of the restaurant have positive relation with frequencies of audit, chain affiliation, penalty, security guards, open kitchen and number of customers. The restaurants are not following all the prescribed laws of the Hotel & Restaurant Act. Based on the findings of the study, it is recommended that Managers should consider the customer's preferences and choices and properly train the kitchen staff about health, hygiene and food practices. Production area should be made compulsory open and ban the washroom in production area. The existing penalty amount should be revised and the laws should provide heavy penalty to restaurant to avoid violations.

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Title: On Measuring Households' Adaptive Capacity To Changing Climate: A Case Study Of Swat District

Abstract: Risk free life can have a positive impact on human development. Climate change impacts are clearly visible in the district Swat and are expected to increase. The ability of individuals to adjust and recover from the hazards of climate change is known as adaptive capacity. Adaptive capacity of household can minimize the risk of climate change vulnerability on human development. To measure the adaptive capacity of local household advance assessment tool is highly needed. This study highlights the factors driving and limiting the capacity of household to adapt environmental change. Household adaptive capacity index (HACI) for Swat district has been constructed for this purpose. We found that household adaptive capacity of rural household of district Swat is very low, 78% households are living in the condition of high vulnerability. Reasons of this high vulnerability according to results are high dependency burden, lack of social contacts, low income level, lack of land rights and low market value of assets owned by household. Besides this other barriers of adaptive capacity are lack of house ownership, level of education of household members and lack of safety nets. It is recommended that high dependency burden on environmental sensitive resources should be reduced, and authorities should take responsibility from making policies to its implications until results come.

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Title: Impact of Energy Consumption on Environment of Pakistan: Testing of Environmental Kuznets Curve Hypothesis

Abstract: This study applied Johansen cointegration estimation technique to check the long run relationship between disaggregates energy consumption and environment. We also check the existence of Environmental Kuznets Curve with disaggregated energy data. Time series data set are used from 1971 to 2015 for Pakistan. ADF and PP tests are applied in this study. Results reveal that oil consumption in power, industry and transport sector have statistical significant and positive impact on CO₂ emissions, While Environmental Kuznets Curve does not exist in this model. Gas consumption in household, power, and industrial sector have statistical significant and positive impact on CO₂ emissions. While Environmental Kuznets Curve also does not exist in this model. Coal consumption in brick kilns sector affects emission positively and the impact is statistically significant. Results confirm that Environmental Kuznets Curve does not exist in all models. According to policy recommendations, firstly we should move to hydro power plants from thermal and secondly we should also improve our public transport system.

Supervised by: Dr. Usman Mustafa

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Title: Impact of Climate Variability on Incidence of Diseases: A Case Study of District Kotli, Azad Kashmir

Abstract: Climate change is one of most emergent issue that covers all the challenges that are being faced by the human beings almost over whole globe. Predominantly health sector is exaggerated more severely in this century through changes in climate. To establish a relationship among monthly hospital out-patient department visits for ischemic heart disease, hypertension, acute respiratory infection, asthma, pneumonia and diarrheal diseases with monthly climatic variables such as monthly mean minimum and maximum temperature, total rain, relative humidity, atmospheric pressure and wind speed. Negative binomial regression was applied on 2011-2015 monthly data for estimation of relationship among number of OPD visits for diseases and weather determinant on Stata software. CVD was found significant with temperature and no relation was found with humidity. Whereas, gastrointestinal diseases like total diarrhea found significant with minimum temperature and rainfall. Similarly, diarrhea for < 5 years was found significant with atmospheric pressure as well as for maximum and minimum temperature. For respiratory diseases temperature, wind speed and atmospheric pressure was found significant whereas relative humidity and rainfall were insignificant factors for the disease in the area. The complexity among disease epidemiology with climatic factors needs detailed analysis.

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Title: Economic And Environmental Impacts Of Zoning In Islamabad

Abstract: Environmental problems such as air pollution, noise pollution, water pollution and congestion, are becoming critical across the globe. To overcome many problems related to urbanization including the environmental concern in many developed and developing countries, one essential tool is zoning. This study estimated the impact of zoning on congestion, air pollution, noise pollution, waste management, land values, greenery and plantation and access to safe drinking water in Islamabad. Besides, the environmental behavior, welfare gains and loss of the residents due to zoning are also analyzed. For this study, a sample of 266 households from Islamabad was used and analyzed through descriptive statistics. The main findings of the study revealed that central sectors of Islamabad qualified the zoning regulations while Bharakahu doesn't. Zoning has a negative impact on the congestion, air pollution, noise pollution, waste management and positive impact on the water availability, greenery and plantation, land values, environmental behavior of the residents. The residents of zoned area get higher welfare gains as compared to the residents of non-zoned area. In non-zoned area, there is lack of provision of basic amenities. It is recommended that, in non-zoned area, there should be provision of all necessities and the future developing areas should be made according to zoning regulations.

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Title: Does Income Growth And Trade Expansion Reallocate The Ecological Footprints? A Case Study of Pakistan

Abstract: This research aims to disaggregate the ecological footprints of Pakistan in relation to income growth and other explanatory variables, like trade openness bio-capacity and energy use. This study has also investigated the EKC type relation between income growth and environmental pressure, Using secondary data for the period of 1980-2015 for Pakistan. This research has utilized the ARDL bound technique to determine short run and long run relation between income growth and per capita footprints for each economic activity separately. Research found that Pakistan is importing greater share of its total pollution from other economies over the time as the income increases. Consumption footprints are relocated by growing income of the Pakistan economy. As the income grows up, negative environmental consequences are trade across the borders but inflow is quite higher than inflow in case of Pakistan.

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Title: Energy Poverty And Its Impact On Environment: A Case Study Of Pakistan

Abstract: This study examined the impact of reduction in energy poverty on environment. Energy poverty is defined in several ways. For example, percentage of household expenditure on energy use or alternatively in terms of access to clean energy products and services such as electricity, natural gas and LPG etc. Pakistan Social and Living Standard Measurement (PSLM) data for 2013-14 is utilized to compute Multidimensional Energy Poverty Index. The index, based on data for different fuels heating, lightening and cooking, is computed to assess incidence of energy poverty. The list of fuel includes firewood, coal, kerosene oil, Gas (Cylinder), Gas (Pipeline), electricity from regular distribution system of WAPDA and from Generators. Multidimensional Energy Poverty Index (MEPI) is showing that 69.67 percent households are deprived of clean fuel for cooking and 47.11 percent are deprived of clean fuel for heating. However, for lighting only 9.04 percent households do not have access to clean source. The results show that per capita income is the major determinant of demand for firewood, coal, kerosene oil, electricity, gas and generator. Findings show that as households move from low income to high income group per capita consumption for firewood, coal and kerosene oil reduces, while per capita consumption for Gas (Cylinder), Gas (Pipeline) and electricity increases. Income is positively related with consumption of clean energy sources. Income is negatively related with consumption of firewood, coal and kerosene oil. Furthermore, study finds that CO₂emission can be reduced significantly through improving access (Access through subsidization, regulation and increasing supply) of low income group to the energy mix of high income group. If highest income group's energy mix is available to poor, for cooking and heating purposes, the emission will decline to 755.869 metric ton (per month) from current emission of 2039.520 metric ton (Per month). Per household emission will also decline by 44.69 kgCo/kwh if highest income group energy mix is available to all households.

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Title: Role And Loss Of Biodiversity: Implications For Local Community Of Hangu District, Khyber Pakhtunkhwa

Abstract: The link between biological diversity and the livelihood of a community has always been important and is of great significance in all eras. This study aims to identify different factors that affect the biodiversity of the district Hangu, KP Pakistan. Moreover, it analyzes the role and loss of biodiversity in the district in connection with livelihoods of the local community in 6 selected villages of district Hangu. The study was based on primary data collected through well-structured questionnaire from the owner of privately conserved areas, local residents, farmers, woodcutters, wood sellers, hunters, honey bee keepers, shepherds/cowherds, Jirgah heads and Hakeems/local medical practitioners. Data was analyzed through descriptive statistics, binary logistic and liner regression. Results showed that factors such as deforestation, hunting and climate change affect the availability of birds and plants species negatively while water availability and protected areas had a positive effect on the biodiversity. The use of pesticides on crops was negatively significant with birds' visits on crops. Moreover, the livelihood of local community was dependent on biodiversity and the role of institutions and local community in conserving the biodiversity had not been satisfactory and hence need improvement.

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Title: Analysis Of Ecological Footprint Of Rural-urban Households In Islamabad

Abstract: Pakistan is among the ecological deficit countries which means we are consuming more than what we actually have. Change in the demands of households and lifestyles put pressure on the resources and ultimately on environment. Exploring the pattern of consumption and wastage of resources at household level is the need of the day. The present study aims to estimate Ecological footprints for urban and rural household in Islamabad taking into account the components of food, transportation, housing and consumer goods & services. Further, the impact of various influencing factors on the ecological footprint in urban and rural areas was also estimated. For this purpose, primary data had been collected from 600 households through questionnaires from sampled urban and rural areas of Islamabad. The findings revealed that the average ecological footprint of Islamabad is 4.5 Gha and households of Islamabad require on average 2.5 planets to live with current living standard and pattern with an average of 9.2 tonnes of CO₂ emissions. The sectors with high level of income, high standard of living and high quality of life have high ecological footprint. Households with high ecological footprints are generating more amount of waste. More the usage of meat by the household more will be the ecological footprint. The traveling distance in a week increases, the ecological footprint also increases. Family size of household and ecological footprint is negatively related. The major influencing factors of the ecological footprint were monthly income, family size, education, job type, business, house story, energy efficient appliances, gaseous appliances, farm production, commercially packed products, public transport, gas fuel for heating, electricity for heating, volume of waste and car ownership. Based on the findings, it is recommended that the household ecological footprint of Islamabad needs to be reduced to lessen the pressure on the consumption of resources and also to reduce the emission level for sustainable development of the city. This can be done through awareness, supporting environment friendly products by the authorities.

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