A
SEMINAR ON
"THE INTERDISCIPLINARITY OF ECONOMICS"

ON

Dt. 27.12.2022

RESOURCE PERSON
Dr. Diptimayee Nayak
Asst. Professor
Department of Humanities & Social Sciences
IIT, Roorkee

Organised *by*

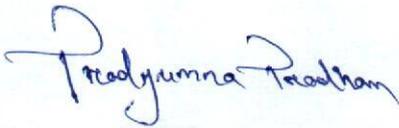# DEPARTMENT OF ECONOMICS

PATTAMUNDAI COLLEGE, PATTAMUNDAI

# DIST-KENDRAPARA, ODISHA, PIN-754215

REPORT

A departmental seminar for the session 2022-2023 was organized by the Department of Economics, Pattamundai College, Pattamundai on dated 27-12-2022 on the topic *"The Interdisciplinarity of Economics"*. Dr. Diptimayee Nayak, Assistant Professor, Department of Humanities and Social Sciences, IIT Roorkee joined the seminar as the resource person.

The meeting was presided over by Prof. Dilip Kumar Bhuyan, Administrative Bursar, Pattamundai College, Pattamundai. The meeting was commenced at 11.30 A.M. with the lighting of candle by our respected guest. Mr. Pradyumna Pradhan, Head Department of Economics gave a key note address of the topic and Mr. Subhasis Mishra, lecturer in Economics, Pattamundai College, welcomes and introduced guest of honour on this occasion.
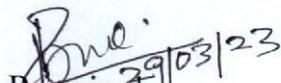
The meeting was ended with vote of thanks by Mrs Rasmita Panigrahi, Lecturer in Economics.

HOD

Economics
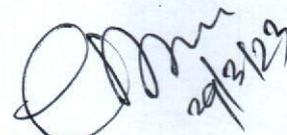
IQAC Co-ordinator

Pattamundai College

Principal

Pattamundai College

PATTAMUNDAI COLLEGE

NAAC ACCREDITED B GRADE

PATTAMUNDAI, KENDRAPARA, ODISHA - 754215

Ref No. :............1309............

Date........26/12/2022....

To

Dr. Diptimayee Nayak
Asst. Professor
Department of Humanities & Social Sciences
IIT, Roorkee.

Sub:- Request to be a Resource person in the Seminar on the topic **"The interdisciplinarity of Economics: Lessons from two projects"** to be organised by **Department of Economics** , Pattamundai College.

Madam,

It is my pleasure to invite you to be a **Resource person** in the **Seminar** on the topic **"The interdisciplinarity of Economics: Lessons from two projects"** going to be organised by **Department of Economics** Pattamundai College, Pattamundai at 10.00A.M. on **27**th **December 2022** .

Your kind consent is eagerly awaited.

26/12/22

Principal

Pattamundai College

To   Dt: 26/12/2022
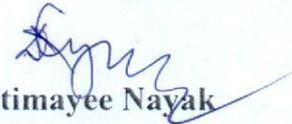
The Principal
Pattamundai College
Pattamundai

Sub: Consent letter for the seminar on "**The interdisciplinarity of Economics: Lessons from two projects**".

Sir,

In response to letter no **1309, dt: 26/12/ 2022**, It is my pleasure to accept your invitation for the seminar on "**The interdisciplinarity of Economics: Lessons from two projects**". I will join the said programme on 27th December 2022 at 10.00 a.m.

Thank You

Dr. Diptimayee Nayak
Asst. Professor
Dept. of Humanities & Social Sciences
IIT, Roorkee.

Office of the Principal
Pattamundai College, Pattamundai

<u>**NOTICE**</u>

No _____ 1310 _____   Dt _26/12/22_

All the staff members are requested to participate and cooperate in the Seminar on **"The interdisciplinarity of Economics: Lessons from two projects"** to be organiged by Department of Economics, at 10.00 A.M on 27th December 2022 in our institution.
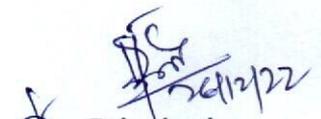
Principal
Pattamundai College


INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

Interdisciplinarity of Economics: Lessons from two projects

Diptimayee Nayak, Ph.D
Department of Humanities and Social Sciences
Indian Institute of Technology Roorkee
Email: dipti.nayak@hs.iitr.ac.in
27 December 2022

Contents

- Why interdisciplinarity in Economic Sciences?
- Policy requirements. NEP 2020 and Multidisciplinary approach

- Two cases

  – NPV of foregone ecosystem services due to illegal sand mining

  – Monetary losses due to change in hydrological behaviour because of forest fire

- Conclusion

I I T ROORKEE
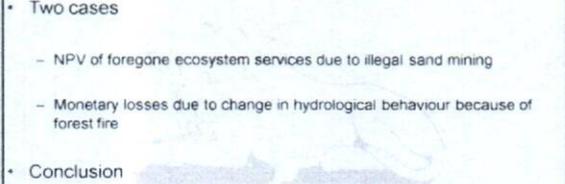
Why interdisciplinarity in Economic Sciences?

- Contiguous disciplines
  – Beyond Amateur interest
  – Imperialism of Economics

  - Epistemology: Constituents of interdisciplinarity in Economics
    - Multidisciplinary models
      – Interchange with contiguous disciplines
      – Better understanding of economic systems
      – Maintaining disciplinary autonomy
    - Transdisciplinary model
      – More radical
      – Pluralist understanding
   – Moving towards a unified science/study/social science

I I T ROORKEE
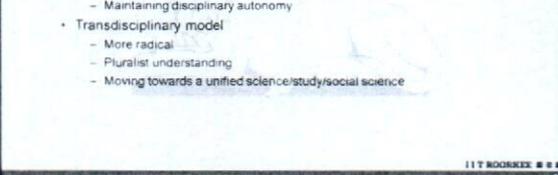
Contd...

- Challenges
  – Institutions
  – Pedigree and training
  – Boundaries of mind, habit and perception
  – The Nature of problem- Purely economic problem??

  – **Economy cannot be left to Economists alone, rather to be more pluralist in approach**
  – Some Instances
    - Experimental psychology and neuroscience to cognitive processes and economic behaviour, lead to choice and economic design of markets
    - Physics and Economics (Mechanistic to thermodynamics in understanding complexity of ecosystems and economy)
   - Game theory to studies on cooperation and strategic behaviour, conflict

I I T ROORKEE
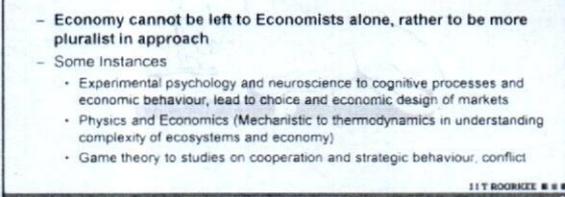
The New Education Policy 2020

- Liberal education

  – Holistic and Multidisciplinary education
  – Collaborative approach
  – Flexible and innovative curriculum
  – Credit-based courses
  – Electives from within and across disciplines

I I T ROORKEE
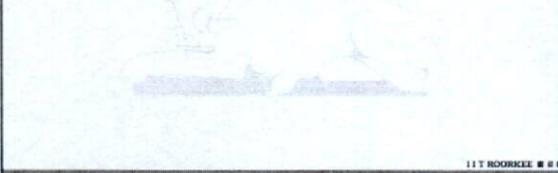
Ecological damages and NPV of future ESS foregone due to illegal sand mining

- The sand mining may impact in **decreasing** qualities/quantities in some of the ecosystem services.

- Some of the other ecosystem goods and services may be **lost completely**

- Examining the ecological damage caused by sand mining and estimating the net present value (NPV) of the impacted ecosystem good and services will be helpful in policy decision making (a requirement for NGT decision).

I I T ROORKEE
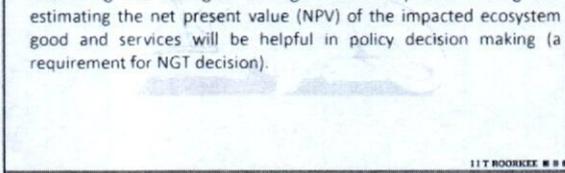
Impacts of illegal sand mining

Sl. No	River Impact	Impact	Impact sub category	Severity of Impacts (1-mild; 2- moderate, 3- significant 4- severe)
1	Morphology	Instability of channel geometry	1 Bed degradation	
			2 channel adjustment	
			3 Bank erosion	
2	Hydrology	i. GW level	1 Change in groundwater table in adjacent areas	
		ii. Change in river flow	2 Variation in flow	
3	Ecology	Loss of local ecological community	1 Size/density of Flora	
			2 Size/density of Fauna	
			3 Habitat	
4	River Structures	Instability to hydraulic structure	1 Damage to hydraulic structure and its surroundings	
5	River Ecosystem	River Ecosystem Services	1 Provisioning ESS	
			2 Cultural ESS	
			3 Regulating ESS	

I I T ROORKEE

Tools Used

- Data generation/ capturing/collection process:
- Secondary data
- Primary data
- Pilot study
- Focus Group Discussions (FGDs) and Stakeholder engagement
- Semi- structured Questionnaire
- Sampling
- GISc and remote sensing

I I T ROORKEE

Variables used for NPV Calculations

- Damages due to illegal sand mining is based on the present value of forgone ecological values which is measured over a period of 5 years.
- In addition, losses occurred to exchequer in the form of increased maintenance and repair due to illegal sand mining is captured in these estimates.
- Ecological losses due to illegal sand mining = $\sum_{t=0} \frac{(RRC)}{(1+r)^t} + \sum_{t=0} \frac{(MBP)}{(1+r)^t} + \sum_{t=1}^{5} \frac{(D+RF)}{(1+r)^t}$

  Where

  RRC = increased road repair cost (RRC) due to illegal sand mining

  MBP = increased maintenance cost of bank protection structures due to illegal sand mining

  D = market value of illegally mined sand

  RF = Risk Factor

  r = Discount rate

  t = time in years

I I T ROORKEE

MBP – Riverbank protection structures maintenance

River Bank Maintenance cost

I I T ROORKEE
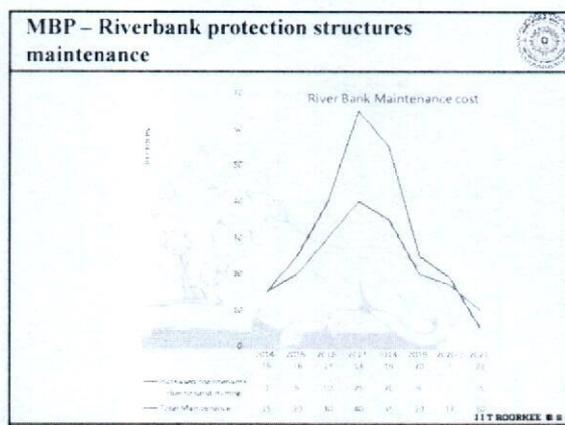
Market value of illegal sand mining (D)

Year	Illegal Quantity	Market Price per M³	Current market value of total exacted sand (INR)
2018-19	51,986	400	2 07,94,400
2019-20	1,11,279	480	554,13,920
2020-21	74,589	1000	745,89,000

I I T ROORKEE

Risk Factor

- Based on the severity level, risk level and risk factor are assigned as in the following table.

Severity of Impact	Mild	Moderate	Significant	Severe
Risk Level	1	2	3	4
Risk Factor	0.25	0.5	0.75	1

I I T ROORKEE

Discount rate - r

- Discount rate for NPV varies from 5% to 8% based on the severity level of Impact
- If the severity level is severe, the discount rate is lowest at 5%, whereas if the severity level is mild, the discount rate is highest at 8%.

Severity of Impact	Mild	Moderate	Significant	Severe
Risk Level	1	2	3	4
Risk Factor	0.25	0.5	0.75	1
Discount rate	8%	7%	6%	5%

IIT ROORKEE

Calculations of NPV 2018-19 illegal mining

- Total benefits= Fines + Penalty = 3,19,600

- Total Cost of ecological values for the year = D x RF

- Market Value of Excess extracted material (D) = Excess extraction x market price= 51,986 x 400 = 2,07,94,400

- Total Cost of ecological values for the year 2018-19 = D x RF = 2,07,94,400 x 0.25 = 5198600

- Present Value of forgone ecological values (@ 8% discount rate as severity is mild and over 5 years)

IIT ROORKEE

Contd...

- Total legal mining in 2018-19 = 390133m³

- Total Illegal mining in 2018-19 = 51,986 m³

- **Total Mining** in 2018-19 = 442119m³

- Total illegal mining as percentage = 51,986 /442119*100 = 11.8%

- Road repair cost (RRC) towards illegal sand mining/pa = 10,00,000* 11.8% = Rs 118000

- Maintenance of river bank protection (MBP) structures/pa = 20,00,00,000 * 11.8% = 23603030

IIT ROORKEE

Contd.

- $PV(C) = \sum_{t=0} \frac{(RRC)}{(1+r)^t} + \sum_{t=0} \frac{(MBP)}{(1+r)^t} + \sum_{t=1}^{5} \frac{(D*RF)}{(1+r)^t}$

- $= \frac{(118000)}{(1+0.08)^0} + \frac{(23603030)}{(1+0.08)^0} + \frac{(5198600)}{(1+0.08)^1} + \frac{(5198600)}{(1+0.08)^2} + \frac{(5198600)}{(1+0.08)^3} + \frac{(5198600)}{(1+0.08)^4} + \frac{(5198600)}{(1+0.08)^5} = 44157932$

- Net Present Value = Total Cost - Total Benefits

- NPV of Illegal Sand Mining 2018-19 = NPV (C) = Rs. 44157932– Rs. 3,19,600

    = Rs. 4,41,57,932

IIT ROORKEE

Disciplinary knowledge used

IIT ROORKEE

Monetary losses due to change in hydrological behaviour because of forest fire

IIT ROORKEE

Slide 19: Impact of Forest Fire: Catchment and Hydrological Processes

Impact of Forest Fire on Hydrology

- **Water Cycle**
  - Interception
  - Infiltration
  - Water holding
  - Snow accumulation and melting
  - Surface Runoff at spatial scales

- **Flow and Deposit**
  - River deposit/ sediment
  - River flow
  - Downstream water quality
  - Aquatic life

(Source: Nyamadzawo et al., 2013)

IIT ROORKEE

Slide 20: Impact of Forest Fire on Hydrology and Potential Economic Losses

Consequences - Impacted Areas		Sign	Ground water	Surface water	Identification of loss/ gain	Economic assessment (Feasible, Not feasible)	Approach / Method
Water Cycle	Interception	(-)	●	*	Effect on agriculture and NTFP	F	Quantification and imputed value method
	Infiltration	(-)	*	*	Effect on irrigation, loss of water yield	F	-do-
	Water holding	(-)	*	*	Effect on spring and drinking water	F	Quantification and Product method
	Snow accumulation and melting	(-) (-)	●	●		F	Metadata*
	Surface Runoff at spatial scales	(-)		*	Socio-economic impact of flood, avalanche, bank erosion, soil erosion (hillslope, sub-catchment, catchment and watershed scales)	F	Primary survey based approach and historical data
	Soil erosion	(-)	*	*	Socio-economic impacts	F	Primary survey based approach

(* indicates uncertainty and is dependent on certain variables and situations, * indicates increase, - indicates decrease, and ● indicates no change)

ORKEE

Slide 21: Impact of Forest Fire on Hydrology and Potential Economic Losses

Consequences - Impacted Areas		Sign	Ground water	Surface water	Identification of loss/ gain	Economic assessment (Feasible, Not feasible)	Approach / Method
Flow and Deposit	River deposit/ sediment	(-)			-Depreciation to restoration of barrage dam canal -Benefits in terms of sand mining -Vulnerability of downstream population due to peak flood and loss of assets		Market value opportunity cost approach
	River flow	(-)	*	*			
Downstream water quality		(-)	●	●	Impact on health and livestock	F	Market value and averting behaviour approach
Aquatic life		(-)	●	●	Loss of fishery	F	Market value approach

(* indicates uncertainty and is dependent on certain variables and situations, * indicates increase, - indicates decrease, and ● indicates no change)

Slide 22: Contd...

Physical Impacts of FF on Hydrological Processes and Variables

Impacted Variables/Services

- Run off
- Sediment
- Evapotranspiration
- Storage

Source: Nyamadzawo et al., 2013

IIT ROORKEE

Slide 23: Methods to calculate Monetary Value

- **Replacement cost** Estimates economic values based on costs of replacing or restoring a damaged system/asset/resource/services to its original state and treats this costs as a measure of the benefits of restoration.
- **Assumptions**: if people incur costs to replace/regain/restore the services of ecosystem, then those services must be worth at least what beneficiaries paid to replace/restore them.
  - This method is mostly applied in cases where replacement expenditure have actually been incurred or will be made to regain/restore ecosystem services.
  - (Although in this case, hydrological processes cannot be directly replaced, but the costs are incurred to restore/regain the ecosystem services which generate from these hydrological processes)

IIT ROORKEE

Slide 24: Capturing relevant data

Identification of ESS (hydrological variables)	Types of ESS	Likely Method for economic valuation	Proxy data captured
Run off regulation	Regulating	Replacement	Therefore, we have taken the data like perception on run off, impact of run off in terms of soil erosion, actions taken and likely expenditure incurred to combat soil erosion.
Sediment regulation	Provisioning (when sand mined) / Regulating	Replacement cost/Benefit transfer	Cost of extracting sediments by the major dam/irrigation canal. B_C of Sand mining
Evapotranspiration regulation (soil moisture, soil hardness and soil erosion)	Regulating	Replacement	cost incurred for increasing soil moisture in the adjacent agricultural land irrigating/injecting water to agricultural land; Loss of crop and its lost value.
Storage (soil moisture and GW recharge) regulation	Regulating	Replacement	Expenditure incurred to increase the length of your tube well pipe. Time value of fetching water from new water source

Disciplinary knowledge used

Conclusion

References

- Neves. V. (2017). Economics and interdisciplinarity: an open-systems approach. *Brazilian Journal of Political Economy*, 37(2), 343-362. https://doi.org/10.1590/0101-31572017v37n02a05
- Nyamadzawo, G. et al. (2013). Understanding the causes, socio-economic and environmental impacts, and management of veld fires in tropical Zimbabwe. *Fire Science Reviews*, 2(2):1-13.
- The Journal of Interdisciplinary Economics (Sage)

Thank you

Seminar on "The interdisciplinarity of Economics : Lessons from two projects"

Organised By: Department of Economics, Pattamundai College, Pattamundai

Date: 27th December 2022

SLNO.	Name	Designation and Mobile No.	Signature
1	Dilip Bhuyan	Administrative Berggare PMT. College.	*(signature)*
2	D. Naym	Hechst Preeg. Uterl	*(signature)*
3	Dr S.K. Pradhan	Reader in Chemistry 99371 93076	*(signature)*
4	Prof. Debabrata Fondka	Former Principal, Pattamundai College	9437276344
5	Ranjan Kerin Behur	Lecturer in History 9668830365	*(signature)*
6	Pradyumna Pradha	Lecturer in Economics 9776010619	P. Pradh.
7	Rasmila Panigrahi	Lecturer in Economics 9643271983	Rasmila
8	Subhasis Mishra	Lecturer in Economics 7205425848	S. Mishra
9			
10			
11			
12			
13			
14			
15			
16			
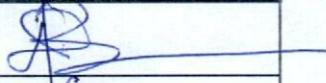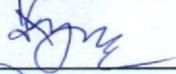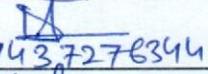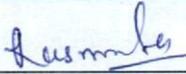
Seminar on "The interdisciplinarity of Economics : Lessons from two projects"

Organised By: Department of Economics, Pattamundai College, Pattamundai

Date: 27th December 2022

SLNO.	ROLL NO.	NAME OF THE PARTICIPANT	MOBILE NO.
1	BA-22-21	Tribeni Malik	8984353156
2	BA-22-30	Deepshikha Parida	9124812398
3	BA-22-06	sushree sangita Nayak	7381132318
4	BA-22-177	Peojarani Nayak	9668013842
5	BA-22-074	Mausumi Parida	7325935368
6	BA-22-081	Sonali Das	7846822623
7	BA-22-186	Bichitra Swain	9336783942
8	BA-22-211	Parthab? Panda	6312829915
9	BA-22-200	Shreya swain	9205497060
10	BA-22-076	Lopita Sahoo	7752033089
11	BA-22-002	Madhusmita Adhikari	8114733445
12	BA-22-001	Satyabhama Biswal	8456933410
13	BA-20-063	Sucharita Rorel	9777841731
14	BA-20-190	Monalisa Kare	9556844267
15	BA-20-013	Monalisha Kare	7684970788
16	BA-20-241	Sonali sangita Sahoo	8018865391
17	BA-20-025	Soumyashree Sahoo	6371746271
18	BA-20-138	Manasi Taral	7327364749
19	BA-20-058	Priyanka Priyadarshani saho	7325820072
20	BA-20-020	Arpita Prili priyambada Behera	9078636558
21			

SLNO.	ROLL NO.	NAME OF THE PARTICIPANT	MOBILE NO
22	BA-20-667	Beersarcene Samal	7894905364
23	BA-20-069	Tamishra Priyadarsini Sethi.	8093619615
24	BA-20-041	Lizanan Sethi	7848845235
25	BA-20-023	Sushree Sitharandhya Samal	7077624110
26	BA-21-096	Madhusmita Rout	9938711795
27	BA-21-028	Subarnna Suvadarsini patra	8457016569
28	BA-21-062	Rasmi Rekha Das	9556490330
29	BH-21-023	Sumitra parida	9668253929
30	BA-21-227	Laxmipriya Rout	9178435405
31	BA-21-105	Bisakha Majhi	8114946520
32	BA-21-254	Priyanka Priyadarshini Sahoo	7847089513
33	BA-21-109	Subhashree Das	7735134496
34	BA21-055	Laxmi Priya Nayak	9827713752
35	BA21-181	Anita Bhuyan	8118067851
36	BA-21-108	Jtishree Nayak	9348809360
37	BA-21-139	Lisarani Sethi	7847942001
38	BA-21-214	Lucky Ojha	8144652357
39	BA-21-211	Smrutismita Jena	7684983934
40	BA-21-167	Abantina Pradhan	9668268289
41	BA-21-092	Swopna ranee Mohanty	8658810147
42	BA-21-149	Rasmita Malik	7205864522
43	BA-21-43	Suchitra Behera	8658945510
44	BA-21-049	Rupali Priyadarshini Sethy	8114652188
45	BA-20-170	Monalisha Nath	8984722894
46	BA-20-168	Ankita Nath	7077254078
47			
48			
49			
50			

SLNO.	ROLL NO.	NAME OF THE PARTICIPANT	MOBILE NO
51	BA22 - 261	Soubhagya Das	6372631093
52	BA 23 - 248	Siddhanta Keshari Parida	9114439080
53	BA 22 - 060	Rudra Narayana Jena	7606049653
54	BA 21 — 215	Satya prasama parida	7894435554
55	BA 21 - 015	manash rayan das	9583280195
56	BA 22 - 227	Kumar Bisoal	7205887783
57	BA 22 - 280	Soumya ranjan Behera	7606880054
58	BA22 - 004	Pruthiraj Singh	9668811033
59	BA20 - 046	Shankarsan Behera	7855915534
60	BA20 - 005	Sanjit kumar Cauje 5	9348542657
61	BA20 - 191	Narendra Ku. Behera	9348890619
62	BA20 - 058	Smrutimayee Pradhan	8984086343
63	BA20 - 002	Souphagya kumar Mishra	7077318232
64	BA21 - 296	Satyapriya Sahoo	7381130033
65	BA21 - 165	Manaranjan mishra	7735581257
66	BA-20 - 196	Akash kumar Patra	7894962519.
67	BA20-109	Subrat Kumar Behera	6371108563
68			
69			
70			
71			
72			
73			
74			
75			
76			
77			
78			
79			

Pattamundai, Odisha, India
HHGF+882, Pattamundai, Odisha
754215, India
Lat 20.575546°
Long 86.573242°
27/12/22 11:45 AM GMT +05:30

27/12/22 11:46 AM GMT +05:30

GPS Map Camera
Pattamundai, Odisha, India
HHGF+882, Pattamundai, Odisha
754215, India
Lat 20.575543°
Long 86.573251°
27/12/22 11:46 AM GMT +05:30

GPS Map Camera
Pattamundai, Odisha, India
HHGF+882, Pattamundai, Odisha
754215, India
Lat 20.575532°
Long 86.573271°
27/12/22 11:46 AM GMT +05:30

ପଞ୍ଚମୁଣ୍ଡାଇ କଲେଜ ଅର୍ଥନୀତି ବିଜ୍ଞାନ ଆଲୋଚନାଚକ୍ର

ପଞ୍ଚମୁଣ୍ଡାଇ, ୨୯।୧୨ (ନିପ୍ର.): ପଞ୍ଚମୁଣ୍ଡାଇ କଲେଜ ଅର୍ଥନୀତି ବିଜ୍ଞାନ ବିଭାଗ ପକ୍ଷରୁ ପରିବେଶ ସୁରକ୍ଷାର ନିରନ୍ତର ବିକାଶ ଶୀର୍ଷକ ରାଜ୍ୟସ୍ତରୀୟ ଆଲୋଚନାଚକ୍ର ଅନୁଷ୍ଠିତ ହୋଇଯାଇଛି। ପ୍ରାଧ୍ୟାପକ ଦିଲୀପ ଭୂୟାଁଙ୍କ ପୌରୋହିତ୍ୟରେ ଆୟୋଜିତ ଆଇ ଆଇଟି ରୁର୍କୀର ପ୍ରଫେସର ଡ଼ ଦୀପ୍ତିମୟୀ ନାୟକ ପରିବେଶ ସୁରକ୍ଷାର ନିରନ୍ତର ବିକାଶ ଓ ଅନ୍ତଃବିଷୟକ ଆଲୋଚନା କରିଥିଲେ। ଅର୍ଥନୀତି ବିଜ୍ଞାନ ବିଭାଗ ମୁଖ୍ୟଅଧ୍ୟାପକ ପ୍ରଦ୍ୟୁମ୍ନ ପ୍ରଧାନ ସ୍ୱାଗତ ଭାଷଣ ଓ ଅଧ୍ୟାପକ ସୁଭାଶିଷ ମିଶ୍ର ଅତିଥିପରିଚୟ ପ୍ରଦାନ କରିଥିଲେ। ଅଧ୍ୟାପିକା ରଞ୍ଜିତା ପାଣିଗ୍ରାହୀ ଧନ୍ୟବାଦ ଦେଇଥିଲେ। କଲେଜ ଆଇକ୍ୟୁଏସି ସଂଯୋଜକ ପ୍ରାଧ୍ୟାପକ ଡ଼ ସୁନୀଲ ପ୍ରଧାନ, ଅଧ୍ୟାପକ ରଞ୍ଜନ ବେହେରା ପରିଚାଳନା କରିଥିଲେ।