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Rice Husk Ash Utilization

TECHNOLOGICAL OPTIONS FOR SILICA RECOVERY

Status of Environment & Related Issues

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EDITORIAL

Rice husk is an agricultural residue abundantly available in rice producing countries around the world. India alone has produced around 31 million tons of rice husk and thus generated 4.65 – 5.58 million tons (15-18% of rice husk) of Rice Husk Ash (RHA) in 2014. The major States under rice cultivation in India are West Bengal, U.P., Andhra Pradesh, Punjab, Odisha etc.

During processing of paddy, rice husk is being produced during de-husking operation. This rice husk finds its application as fuel mainly in industrial boilers being used in dyeing industry, biomass based power plants, paper mills, rubber industry, par-boiled rice mills etc. for steam generation required for various process applications.

In Punjab, Ludhiana - the hub of the Indian Hosiery industry - is consuming around 4.50 lakh MT of rice husk as fuel in industrial boilers, thus generating around 0.7 – 0.8 lakh MT of RHA annually. Presently, this RHA is being disposed off in low lying areas and along road sides which leads to deterioration of ambient air quality due to low bulk density thus posing problems to the nearby residents. The quantum of RHA generation is substantial but did not find any productive use in any of the manufacturing process.

The current issue of newsletter documents a study "Techno-Economic Feasibility Study for Silica Recovery from Rice Husk Ash" carried out by Punjab State Council for Science & Technology (PSCST) with support from Punjab Pollution Control Board in 2015. This article highlights the outcome of study, different technologies available for silica recovery from RHA along with its cost economics for the scientific management of RHA.

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Article Prepared by Consultancy Cell, PSCST

Er. Pardeep Kumar Garg

Er. Mandeep Singh

ENVIS Centre, PSCST is a partner in Regional Centre of Expertise (RCE) Chandigarh on Education for Sustainable Development (ESD) of United Nations University - Institute of Advanced Studies, Japan. This article recommends to promote the technologies to recover silica for scientifc disposal of RHA within the region for sutainable living.

Introduction

Rice Husk (RH) is one of the most widely available agricultural wastes in many rice producing countries around the world. It is majorly prevalent in South-East Asia because of the high rice production in this area due to its fertile land and tropical climate.

During milling of paddy, about 80 % of weight is received as rice, broken rice and bran. Rest 20 % of the weight of paddy is received as husk. RH contains 75-90% organic matter such as cellulose, lignin, etc. and rest mineral components such as silica, alkali & trace elements. A typical analysis of RH is shown in **Table 1**. The content of each constituent depends on rice variety, soil chemistry, climatic conditions and even the geographical location.

Table 1. Typical Analysis of Rice Husk

Property	Range
Bulk density (kg/m^3)	96 - 160
Hardness (Mohr's scale)	5-6
Ash %	22 - 29
Carbon %	~ 35
Hydrogen %	4 - 5
Oxygen %	31 - 37
Nitrogen %	0.23 - 0.32
Sulphur %	0.04 - 0.08
Moisture	8-9

Source: Kumar et al., 2012

The rice milling industry generates a lot of RH that creates disposal problem due to its less commercial interest. The handling and transportation is also a problem due to its low density. Thus, the RH is mostly used as a fuel in the boilers (to generate steam for the parboiling process) for processing of paddy.

When RH is burnt, Rice Husk Ash (RHA) is generated. On burning, cellulose and lignin are removed leaving behind silica ash. Under controlled conditions (temperature and environment) the burning yields better quality of RHA determined by particle size & surface area. Completely burnt RHA is grey to white in color, while partially burnt RHA is blackish.

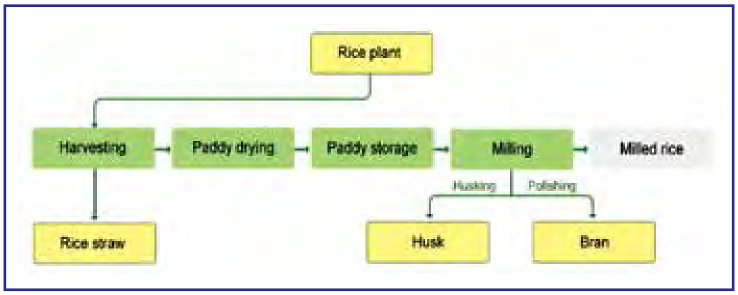
RHA is an environmental threat causing damage to land and surrounding area where it is dumped. The improper disposal may cause pollution in addition to being a health and traffic hazard. Therefore, commercial use of RH and its ash is the alternative solution to disposal problem (Kumar *et al.*, 2012). It is estimated that for every 1000 Kgs of paddy milled, about 200 Kgs of husk is produced, and when this husk is burnt in the boilers, about 50 Kgs of RHA is generated (www.ricehuskash.com).

The use of RHA mainly depends on chemical composition of ash predominantly silica content in it. Due to presence of large silica content in ash, extraction of silica is possible. There is a growing demand for fine amorphous silica in the production of special cement and concrete mixes, high performance concrete, high strength, low permeability concrete, for use in bridges, marine environments, nuclear power plants etc. Further, it can be used in a variety of applications as enumerated in **Plate 1**.

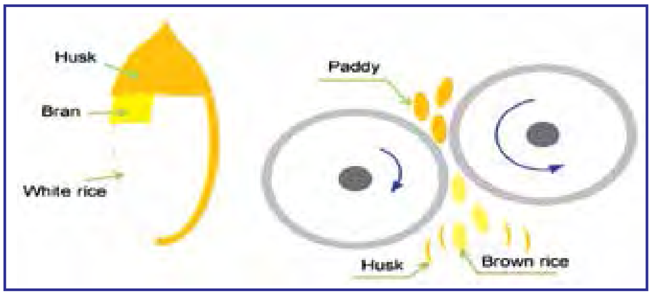
Loading of Rice Husk Ash in trolley

Disposal of Rice Husk Ash along roadside

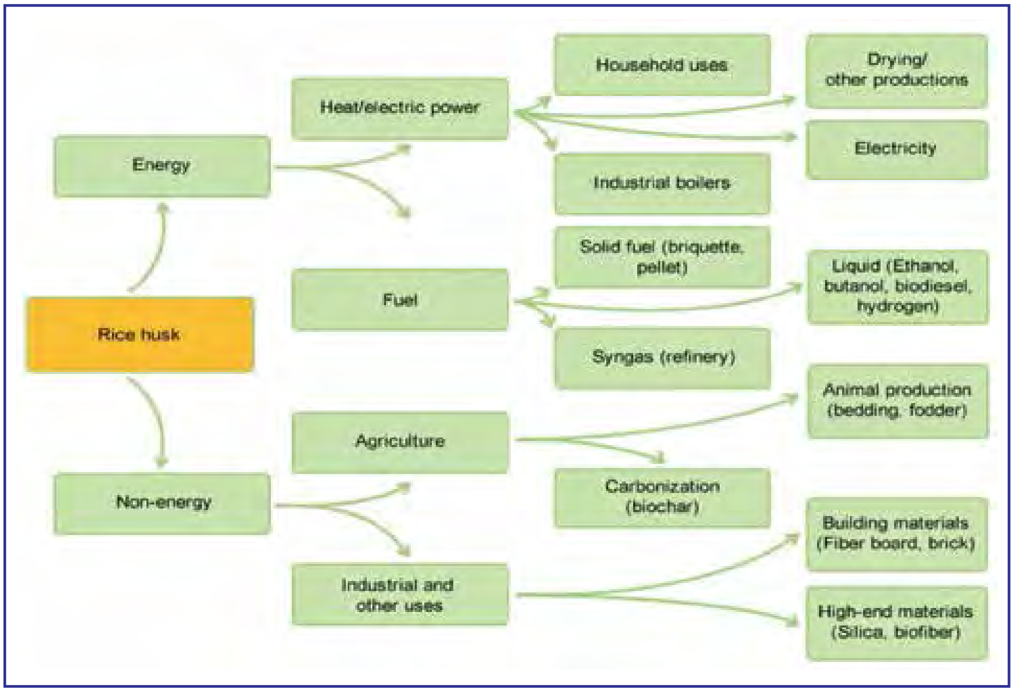
Main by-products of Rice



Parts of Paddy



Potential use of Rice Husk



Common - products from Rice Husk

Rice Husk (loose form)

Rice Husk briquettes

Rice Husk pellets

Rice Husk ash

Carbonized Rice Husk

Source: www.knowledgebank.irri.org

Literature Review

As per literature, there is a potential to recover silica from RHA, which can be used in rubber & tyre industry, construction industry etc. RHA contains the highest amount of biogenic silica in its amorphous form (in excess of 95 wt% silica, SiO_2) (Kaupp, 1984; Kapur, 1985; James and Rao, 1986) compared to other biomass materials, such as ash from sugarcane bagasse (57 – 73% SiO_2) (Jenkins et al., 1996; Natarajan *et al*., 1998; Stephens *et al*., 2003). In addition, the percentage of ash in RH is many times higher (at 13 – 25 wt%, dry basis) (Jenkins *et al*., 1998; Natarajan *et al*., 1998; Armesto *et al*., 2002) compared to that of sugarcane bagasse (at only 1.9 – 6.8 wt%, dry basis) (Jenkins *et a*l., 1998; Natarajan *et al*., 1998; Das *et al*., 2004). A brief of the various R&D activities on silica recovery from RHA is outlined as under:

Mittal D., 1997 in his article *"Silica from Ash"* presented that RHA is one of the most silica rich raw materials containing about 90-98% silica (after complete combustion) among the family of agro wastes. The chemical process discussed not only provides a solution for waste disposal but also recovers a valuable silica product, together with certain useful associate recoveries.

Kalapathy *et al.,* 2000 reported that RHA, a waste product of the rice industry is rich in silica. A simple method based on alkaline extraction followed by acid precipitation was developed to produce pure silica xerogels from RHA, with minimal mineral contaminants. The silica gels produced were heated to 800°C for 12 hours to obtain xerogels. Silica and mineral contents of xerogels were determined by Energy Dispersive X-ray (EDX) and Inductively Coupled Plasma (ICP) emission spectrometers, respectively. Xerogels produced from RHA had 93% silica and 2.6% moisture. The major impurities of silica produced from RHA at an extraction yield of 91% were Na, K, and Ca. Acid washing prior to extraction resulted in silica with a lower concentration of Ca (<200 ppm). However, final water washing of the xerogel was more effective in producing silica with lower overall mineral content.

Della *et al.*, 2002 in their article describes the processing and characterization of high specific surface area silica from RHA. The first step for producing a high specific surface area silica or active silica (AS) from RHA consists of a thermal treatment at various temperatures. The aim of this step is to increase the relative amount of silicon oxide by reduction of carbonaceous materials present in the samples, as well as to burn out other undesirable components detected by chemical analysis. Heating cycles were carried out in air in an electric oven with a heating rate of 10 ^{0}C/min. Each sample was held at a maximum temperature (400, 500, 600 or 700 ^{0}C) for 1, 3 or 6 hours. The samples were cooled down inside the oven. The RHA sample after burning out at 700^{0}C for 6 hours represented the highest amount of silica (94.95%) as compared to the other samples.

Subbukrishna *et al.*, 2007 reported in their article *"Precipitated Silica from Rice Husk Ash by IPSIT (Indian Institute of Science Precipitated Silica Technology) process"* that experiments have been carried out successfully under lab scale and pilot scale to extract the silica from Rice Husk ash. This not only provides value addition but also solves the problem of large amount of ash disposal. The patented Indian Institute of Science Precipitated Silica Technology (IPSIT) developed at CGPL, IISc, Bengaluru is a novel method of extracting precipitated silica in commercially viable way from RHA.

Thuadaij and Nuntiya, 2008 reported in their article that the RHA sample after being burnt at 700 ^{0}C for 6 hours presented higher silica content compared to the other sample at 700 ^{0} C for 3 h. The RHA sample after being extracted by 2.5 N sodium hydroxide generated the yield of pure silica up to 90.3%. The concentration of sodium hydroxide had strong effect on the dissolution of silica from RH and it also removed some impurities which were not dissolved from the main product

Mamdouh *et al.*, 2015 in their article presented the preparation of RHA by Open-field burning and by combustion at 1000 ^{0}C for 4 hours. X-ray diffraction studies of produced RHA revealed that increase in temperature of burning will increase the crystal growth rate with the occurrence of different varying degrees of quartz (Q), Cristobalite (C) and Tridymite (T). The purity concentration of silica in RHA samples were measured by X-Ray Fluorescence and found to be in the range of 82.7-91.6 % with major impurities of K_2O, P_2O_5 and Cr_2O_3. RHA produced via open-field burning was treated with an activating reagent sodium hydroxide (3.5 mol/L), the activated RH so obtained was heated at a temperature of 900°C to get activated carbon. Silica was precipitated from sodium silicate by acidification using sulphuric acid with a % yield of 97% of extracted silica.

Production of Rice Husk in Punjab

Punjab holds place of pride among the Indian States for its outstanding achievements in agricultural development. Over the years, Punjab is amongst the highest ranking states in terms of productivity of rice. Punjab Agriculture Department has estimated that its paddy (basmati and non-basmati rice varieties) production is around 186 lakh tonnes for the 2016-17 kharif season which is nearly 10 lakh tonnes more than last year's production. During 2014-15 the paddy yield in state (3838 Kgs per hectare) was highest in the country and contributed 24.2 % of rice to Central Pool during the same year. The national and the global rice production is given in **Box 1.**

In Punjab, Ludhiana which is known as the hub of Indian Hosiery industry is consuming around 4.50 lakh MT of RH as fuel in industrial boilers, thus generating around 0.7 – 0.8 lakh MT of RHA annually. Presently, this RHA is being disposed off in low lying areas and along road sides which leads to deterioration of ambient air quality due to low bulk density thus posing problems to the nearby residents. The quantum of RHA generation is huge but did not find any productive use in any of the manufacturing process.

In the year 2015, Punjab State Council for Science & Technology carried out a project titled **"Techno-Economic Feasibility Study for Silica Recovery from Rice Husk Ash"** supported by Punjab Pollution Control Board (PPCB). The study focused on Ludhiana which is identified as one of the critically polluted area by Ministry of Environment, Forests & Climate Change (MoEFCC), GoI vide office memorandum J-11013/5/2010-IA (I) dated 13/1/2010. During the study, a team of PSCST Engineers visited various industrial clusters and 2-3 dyeing units of each cluster was studied. It was observed that dyeing industry is the major sector, where Rice Husk is used as fuel in boilers for steam generation.

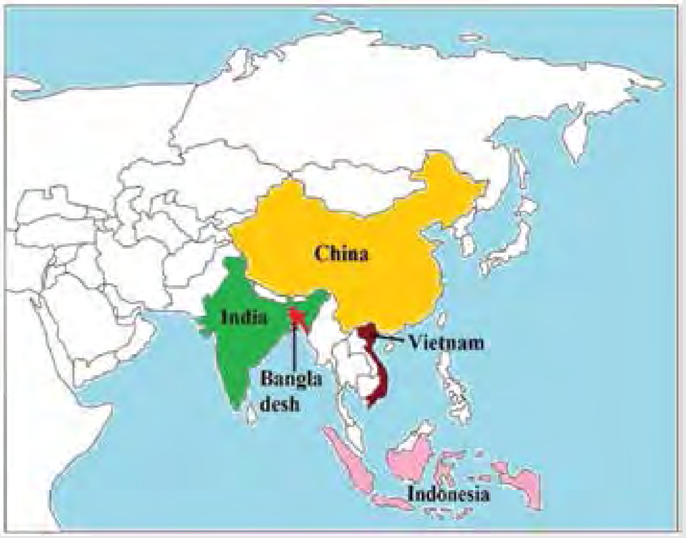
It was further observed that the industries have installed fire tube/ water tube boilers manufactured by M/s Thermax Limited, M/s Cheema Boilers Limited and M/s Misra Boilers Pvt. Ltd. The boiler capacity in small scale units varies from 2- 10 T/hr generating steam at a pressure of 10 -12 kg/cm^2. The steam is mainly being supplied for various process applications at a pressure of 5 - 8 kg/cm^2.

The boiler system consists of feed water system, fuel feeding system and steam distribution system. The feed

Box 1. Production of Rice and Rice Husk: A Global & National Scenario

As per Food and Agricultural Association of the United Nations, the worldwide production of rice in 2014 was around 740 million tons hence 148-185 million tons (20-25% of crop approx.) of RH was produced.

As per Indian National Agricultural Research Systems of ICAR-IARI, the country has largest area under paddy in the world and ranks second in the rice production after China (www.krishikosh.egranth.ac.in). Further, in 2014, China and India have produced 208 and 157 million tons of rice, respectively. Thus, India and China together account for 50% of global rice production. Together with Indonesia, Bangladesh, Vietnam, Myanmar, Thailand, Philippines, Japan, Pakistan, Cambodia, Republic of Korea, Nepal and Sri Lanka, Asian countries account for 90% of the world's total rice production. Other major non-Asian rice producing countries include Brazil, United States, Egypt, Madagascar and Nigeria, which together account for 5% of the rice produced globally. The top 5 rice producing countries in the world in 2014 are as shown in **Map 1**.



Map 1 : Top 5 Rice Producing Countries in the World

India alone has produced around 31 million tons of RH and thus generated 4.65 – 5.58 million tons (15-18% of RH) of RHA in 2014 (Department of Agriculture and Cooperation, GoI, 2015). The major States under rice cultivation in India are West Bengal, U.P., Andhra Pradesh, Punjab, Odisha etc.

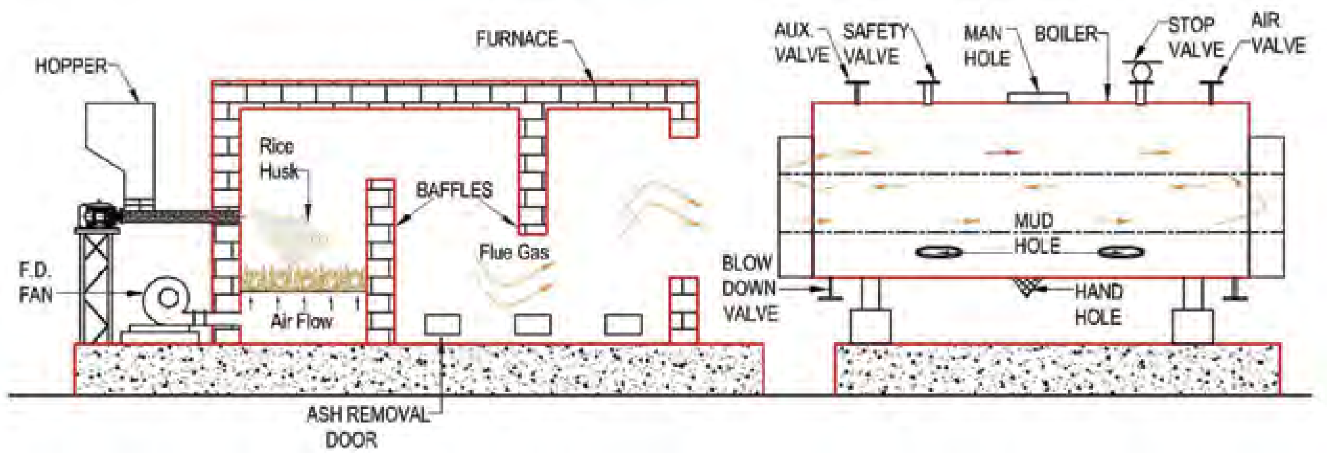


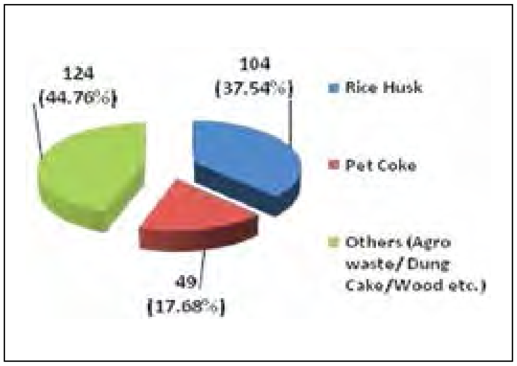
Fig 1 . FBC furnace integrated with boiler

water system provides water to the boiler and regulates it automatically to meet the steam demand. Various valves provide access for maintenance and repair. The steam distribution system collects and controls the steam produced in the boiler. Steam is distributed through a piping system to the point of usage. A schematic view of the Fluidized Bed Combustion (FBC) furnace along with boiler is shown in Fig 1.

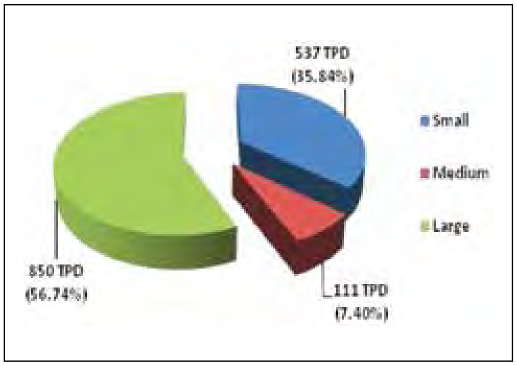
Rice Husk Ash Generation

There are around 277 industries in Ludhiana which are using boilers (mainly FBC) for their process requirement. Out of these industries 11% are large scale units, 5% medium scale and remaining 84% are small scale units. Rice Husk, Pet Coke, Mustard Straw, Dung Cake, Wood etc are used as fuel. The industry-wise fuel utilization pattern reveals that 37.54% industries are using RH, 17.68% industries are using pet coke and remaining 44.76% industries are using agro waste / wood / dung cake etc. **(Graph 1)**.

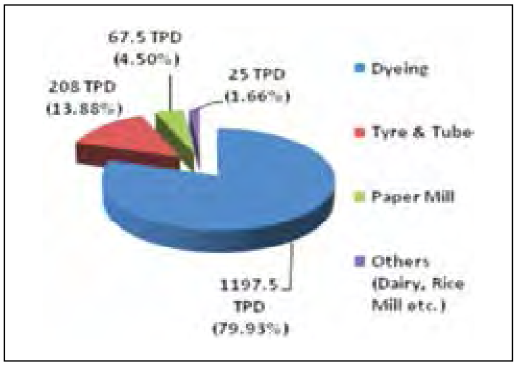
Industries utilizing RH as fuel in FBC generates RHA which is mainly collected from side doors of furnace & air pollution control device (SMEs have installed single cyclone/ set of cyclones to control air pollution). The water is sprayed on RHA so that it does not get air borne. The small and medium scale units are disposing off their RHA in low lying areas and along road sides. These units are paying Rs. 400-500/trolley to the contractor for disposing off moist RHA. The total consumption of RH in Ludhiana has been estimated as 1498 TPD with RHA generation of 225 – 270 TPD (15-18% of Rice Husk consumption) as shown in **Graph 2 & Graph 3.**



Graph 1. Industries using different Fuel



Graph 2. Category wise Rice Husk consumption



Graph 3. Sector wise Rice Husk Consumption

Rice Husk Ash Collection and Disposal Mechanism

Rice Husk

Burning of Rice Husk in Furnace

Use of Cyclone for collection of RHA

Steam generation in Dyeing Industry

RHA collection in Dyeing Industry

Transportation of RHA by tractor-trolleys

Disposal of RHA along road sides

Table 2. Characteristics of Rice Husk Ash in Study Area

Sr. No.	Parameters	Unit	Sample 1 (Ludhiana)	Sample 2 (Dera Bassi)	Sample 3 (Nawanshaher)	Sample 4 (Ludhiana)
1.	Silica	%	82.82	84.31	80.20	81.24
2.	Fixed Carbon	%	3.40	0.90	3.32	7.69
3.	Volatile Matter	%	2.61	2.20	3.03	3.00
4.	Moisture	%	0.82	0.85	1.50	1.01

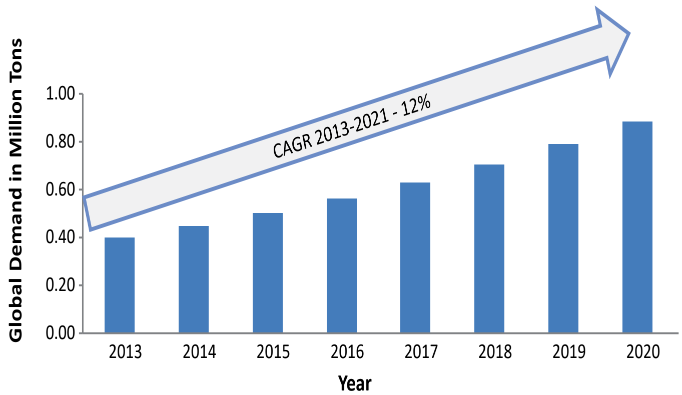
Characteristics of Rice Husk Ash

The quality of RHA mainly depends upon its chemical composition, pre-dominantly silica content. The silica content & its mineralogical structure depend upon the combustion time, temperature and turbulence during combustion. During the study, 4 samples of RHA were collected for analysis from the industries, consuming RH in large quantities such as dyeing, dyeing with co-generation facility and tyre & tube manufacturers. The silica content in RHA was found to be in the range of 80-84% indicating scope for silica recovery with details in **Table 2.**

Identification of Technology Providers

A stake holder meeting was organized on August 6, 2015 by PSCST, wherein identified technology providers made a presentation on their technology for silica recovery from RHA.

During the meet, it was revealed that the estimated demand of amorphous precipitated silica across the globe is 2.2 MMT per annum with annual growth rate of 4-6%, whereas highly dispersible silica grade of precipitated silica has market share of 20% of total amorphous precipitated silica. Demand for this grade of silica is expected to increase at growth rate of 12% during 2013-2020 (**Graph 4**).



Graph 4. Global demand of Highly Dispersible Silica (HDS)

Stakeholders Meet at Chandigarh

Technological Options to Recover Silica from RHA

In the conventional process, silica is recovered from silica sand. The sodium silicate is manufactured by fusing pure silica sand with soda ash in rotary furnace at 1300°C. When the mould cools down, a clear glass of sodium silicate is obtained. The sodium silicate produced in the first stage undergoes acid precipitation to produce precipitated silica. This technique is highly energy intensive as it requires the reactants to be heated to elevated temperatures.

However, the study reveals that silica can be recovered from waste material (RHA) either by carbonation route or acid route. The silica recovery from RHA is in the range of 60-65%. The brief process details of both the technologies are detailed as under and the major components required for the production of silica from RHA are given in **Box 2**.

Box 2: Major Components for Silica Production

The major components required for the production of silica from RHA are enlisted below:

- Reactor and Storage Vessels
- Filter Press
- Spray Drier
- Hot Air Generator
- Nano-filtration
- Multi Effect Evaporator
- Crystallizer
- Boiler

Carbonation Route

The Silica recovery from RHA consists of three stages named as digestion, precipitation and re-generation. The first stage involves the digestion of RHA with caustic soda at specific conditions. In this stage, silica present in the ash gets extracted with caustic soda to form sodium silicate solution. After the completion of the digestion, the solution is filtered for the residual undigested ash

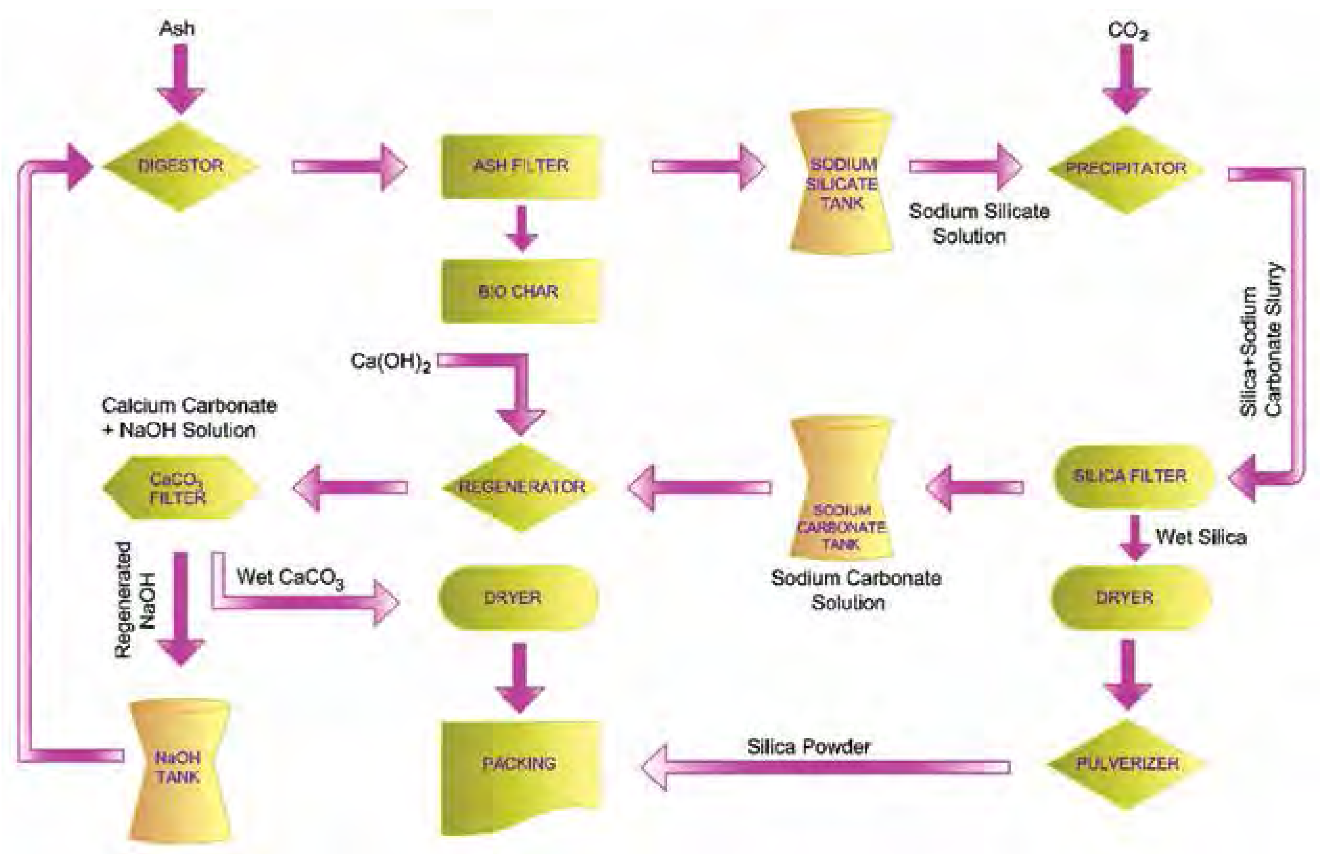


Fig 2. Process Flow Diagram of Carbonation route

Silica Recovery Plant of capacity 5 TPD at M/s Usher Agro Pvt. Ltd., Chattha, Mathura

present in the solution to get Bio-char. The clear filtrate of sodium silicate solution is taken for precipitation.

$$SiO_2\ (RHA) + 2NaOH \rightarrow Na_2SiO_3 + H_2O + \text{Bio-char}$$

During precipitation, carbon dioxide at a specific flow rate is passed through the sodium silicate solution at designed conditions. Continuous stirring is employed during the operation. The precipitated silica is filtered, washed with water to remove the soluble salts and dried. The filtrate containing sodium carbonate is taken for re-generation.

$$Na_2SiO_3 + CO_2 \rightarrow SiO_2 + Na_2CO_3$$

Regeneration is the step where calcium compound reacts with the sodium carbonate to form calcium carbonate and sodium hydroxide. The resulting solution is filtered to remove the solid calcium carbonate and the aqueous sodium hydroxide is recycled to the first stage of digestion. The calcium carbonate is washed with water and dried.

$$Na_2CO_3 + Ca\ (OH)_2 \rightarrow 2NaOH + CaCO_3$$

M/s Usher Agro Pvt. Ltd., Chattha, Mathura (U.P.) has installed 5 TPD silica recovery plant based on the above technology developed by Indian Institute of Sciences (IISc), Bengaluru.

Acid Route

The silica recovery from RHA by acid route consists of three stages i.e. Causticization, Digestion and Precipitation. The calcium carbonate, adsorbent and sodium sulphate are obtained as by-products. The first stage involves producing sodium hydroxide solution using soda ash and calcium hydroxide which is required for the digestion of Rice Husk ash. The calcium carbonate obtained as by-product is filtered and dried. Alternatively, sodium hydroxide can be purchased from the market.

$$Na_2CO_3 + Ca\ (OH)_2 \rightarrow CaCO_3 + 2NaOH$$

The second stage involves the digestion of RHA with sodium hydroxide solution produced in the first stage. The silica present in the ash gets extracted with caustic soda to form sodium silicate solution. After the completion of digestion, the solution is filtered for the residual undigested ash present in the solution to get Adsorbent as by-product. The clear filtrate of sodium silicate solution is taken for precipitation.

$$SiO_2 \text{ (Ash)} + 2NaOH \rightarrow Na_2SiO_3 + H_2O + \text{Adsorbent}$$

The third stage involves the precipitation of sodium silicate solution with sulfuric acid at designed conditions. Continuous stirring is employed during the operation. The precipitated silica is filtered, washed and dried. The filtrate containing sodium sulphate as by-product is filtered, concentrated in multiple effect evaporators followed by crystilization in crystallizer. The technical specifications of by-products are given in **Box 3**.

$$Na_2SiO_3 + H_2SO_4 \rightarrow SiO_2 + Na_2SO_4 + H_2O$$

The above technology has been developed at lab scale by M/s Bridgedots Tech Services, Noida and M/s AURO Associates, Vadodara. Further, the adsorbent obtained as by-product during digestion of RHA can also be converted into activated carbon by processing it with mineral acid followed by microwave drying.

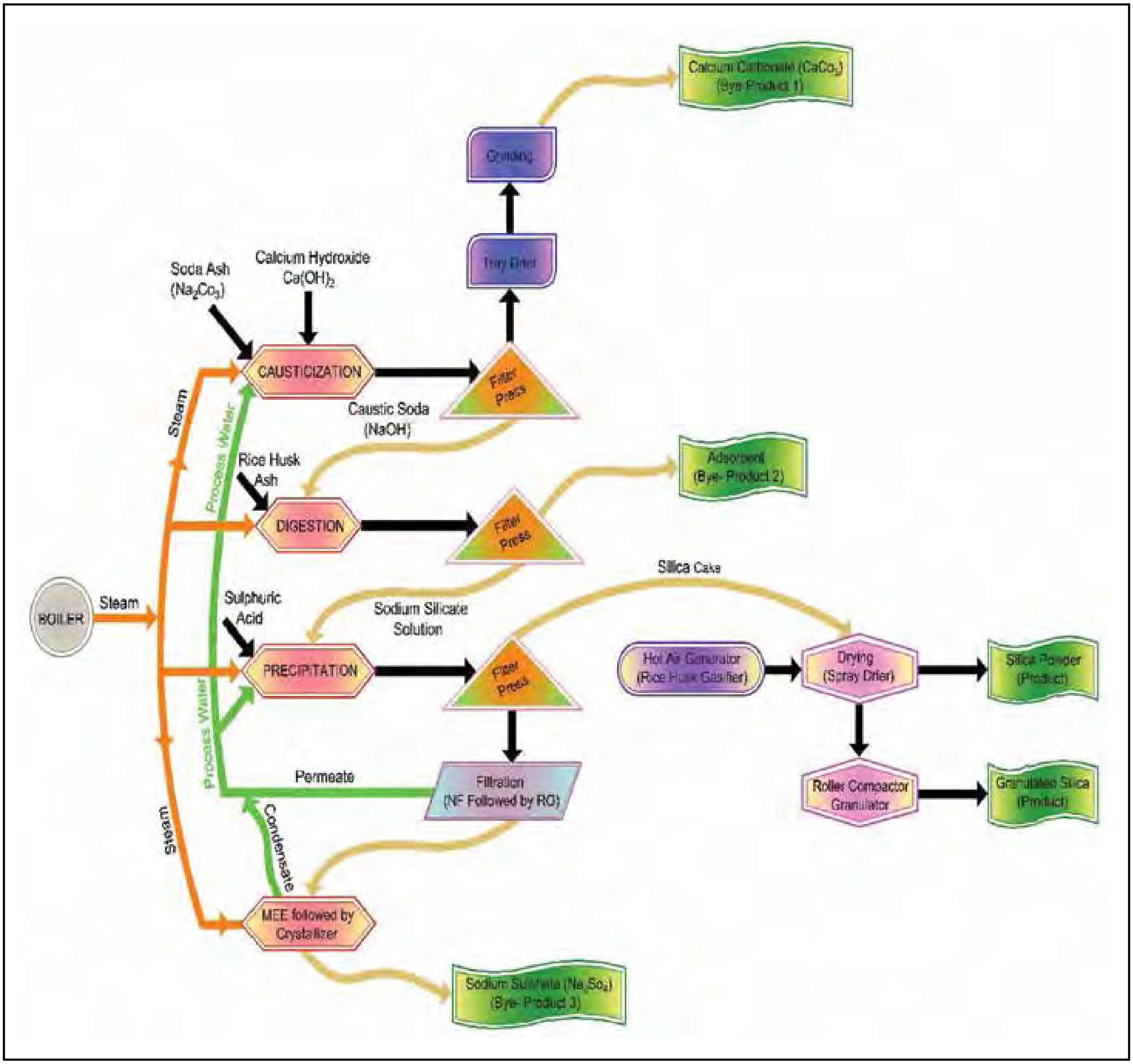


Fig 3. Process Flow Diagram of Acid route

Technology demonstrated at lab scale by M/s Bridgedots Tech. Services at IIT-BHU, Varanasi

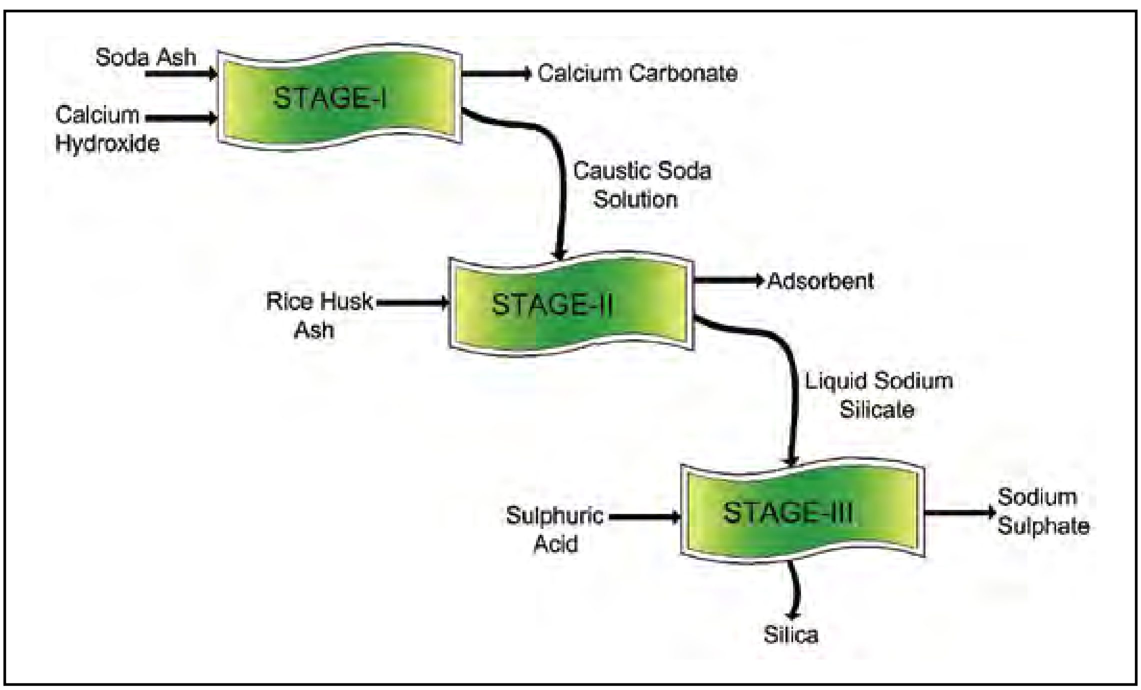


Fig 4. Various stages of Silica Recovery Process

Box 3: Technical Specifications of Silica and by-products from RHA

S.No.	Parameters	Details		
		Silica	Sodium Sulfate	Adsorbent
1	Form/Appearance	Powder/Granules/Micro pearl	White Powder	Powder
2	Surface Area, BET* (m^2/g)	160 ± 10	-	200 ± 10
3	Moisture	7± 1	NMT** 5%	7 ± 1
4	pH	6.5±0.5	-	4-6
5	Na_2SO_4 on Anhydrous Basis	-	NLT*** 99%	-

*Brunauer-Emmett-Teller ; **Not More Than; ***Not Less Than

Cost Economics

The cost economics for setting up of 10 TPD silica recovery plant based on RHA are tabulated as under:

S. No.	Description	Carbonation Route	Acid Route
1.	Capital Cost (Rs. in crores)	30.0	11-12
2.	Land Req. (acres)	3.0	1.2
3.	Power (KW)	1000	750
4.	Production Cost (Rs)	35/kg	40/kg
5.	Selling Price (Rs)		
	Silica	60 -80/kg	60- 80/kg
	$CaCo_3$	12- 15/kg	12-15/kg
	Bio Char	3- 4/kg	-
	Adsorbent	-	3- 4/kg
	Na_2SO_4	-	15-20/kg

Way Forward

The quantum of RHA produced in the State has been estimated around 500 TPD which is presently being disposed off in low lying areas and along road sides, thereby deteriorating the ambient air quality. The technologies for the recovery of Sodium Silicate / Precipitated Silica have already been identified which need to be demonstrated in the State for the scientific management and disposal of RHA.

PSCST is trying to mobilize funds to demonstrate the sodium silicate/silica recovery technology from RHA as far these technologies have not been demonstrated anywhere in Punjab. One of the industries has also shown willingness for setting up of the demonstration plant in the State. The demonstration plant will motivate the other industries in Punjab to adopt this technology and promote gainful utilization of RHA.

PLATE 1

APPLICATIONS

SILICA

Silica is used in rubber industries as reinforcing agent. It is used as an anti-caking agent in cosmetics, toothpastes, food industries, etc. There is a growing demand for fine amorphous silica in the production of high performance cement and concrete to be used in bridges, heavy duty concrete,etc. The consumption of silica in the rubber & tyre industry is around 60% and rest (40%) is consumed in the production of pesticides, printing ink, tooth paste etc. The major applications of silica are discussed below:

- **Footwear :** Precipitated silica is used in shoe soles for its resistance to wear. It provides superior durability, resilience and improved modulus. It acts as white reinforcing agent facilitating manufacturing of colored end products. Precipitated Silica provides superior durability and resilience while improving compound stiffness for all types of rubber sole footwear.
- **Conveyor Belt & Transmission belt :** Precipitated Silica is used to improve the tear strength due to its small particle size and complex aggregate structure. It is used to prevent cracking and growth of cut in conveyor belts and power transmission belts.
- **PVC Sheets :** Precipitated Silica is used to improve pigment dispersion and acts as an absorbent to improve the flow and imparts a dry feel to the compound.
- **Rice Rollers and Rubber Rollers :** Precipitated Silica is used in Rubber Rollers and Rice Rollers for improving the abrasion resistance, stiffness, tear resistance. It provides higher tensile strength, longer life and durability.
- **Rubber and Solid Tyres** : Precipitated Silica is used in tyre industry to improve the tear resistance of truck and heavy equipment tyres and to enhance adhesion between the metallic reinforcement and the rubber of radial tyres. Nowadays, use of precipitated silica has been extended to passenger car tyres as well.

ADSORBENT

It is used in water purification and color removal of waste water.

CALCIUM CARBONATE

It is used in the following:

- Construction industry, either as a building material or limestone aggregate for road building or as an ingredient of cements.
- Purification of iron from iron ore in a blast furnace.
- As raw material in the refining of sugar from sugar beet.

SODIUM SULPHATE

It is being used mainly in Detergent industry, Pulp and paper industry and Glass industry.

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ENVIS Centre Activities

ENVIS Staff's Participation in "National Workshop for ENVIS Centres: Summary Evaluation and Proposed Revamping of ENVIS Scheme" at Ghandhinagar, Gujarat from March 17th to 18th, 2017

Mr. Gurharminder Singh SSO(Env.)/Coordinator during Presentation in Workshop

Shri Ajay Nayayan Jha, Secretary MoEFCC,GoI during his visit to Punjab ENVIS Centre's arena

Environmental Information System (ENVIS) Centre, PSCST Officials namely Mr. Gurharminder Singh SSO(Env.)/ Coordinator ENVIS and Ms. Ravleen, Senior Programme Officer participated in "National Workshop for ENVIS Centres: Summary Evaluation and Proposed Revamping of ENVIS Scheme" organized by Ministry of Environment, Forests & Climate Change (MoEF&CC), Government of India at Ghandhinagar, Gujarat from March 17th to 18th, 2017.

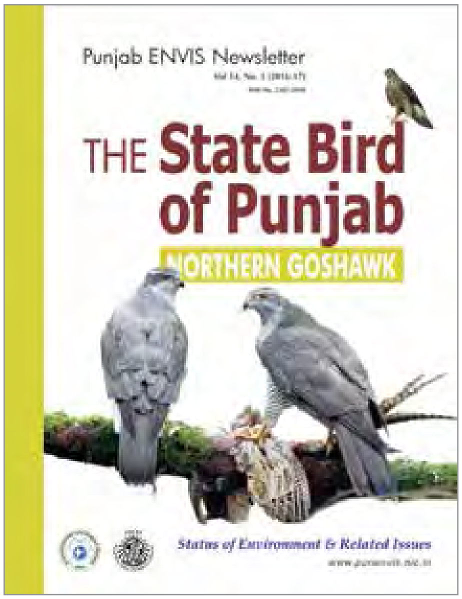
Shri Ajay Nayayan Jha, Secretary MoEFCC, GoI was the guest of honour at the inaugural function of the Workshop for ENVIS Centres at Mahatma Mandir Convention Centre, Ghandhinagar. Shri Arvind Agarwal, Additional Chief Secretary, Forests & Environment Department, Government of Gujarat released the special knowledge products of ENVIS Centers. The Punjab ENVIS Center's publication titled "The State Bird of Punjab : Northern goshawk" was also released at the occasion and was appreciated being first ever document prepared for highlighting all aspects of the State Bird of Punjab.

The inaugural session was followed by summary evaluation review of all the ENVIS Centers, wherein, presentations were given by all the Centers. Mr. Gurharminder Singh also gave presentation on the activities undertaken by the Centre during F.Y. 2016-17 and on proposed future activities. The Expert Committee appreciated the work of the Centre.

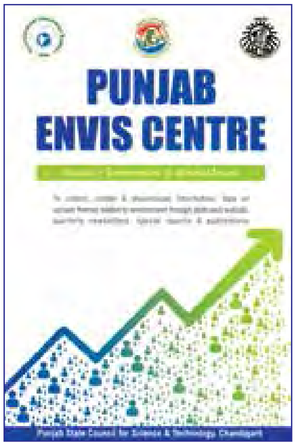
On second day of workshop, the Roll out of the revamped ENVIS Scheme was put forth by Dr. Anandi Subramanium, Senior Economic Advisor, MoEFCC, GoI and Shri Yashvir Singh, Economic Advisor, MoEFCC, GoI. It embarked upon the revamping of ENVIS Scheme on the direction of NITI Aayog to enable to provide readily available data/ information to policy planners for decision support system in GIS & Remote sensing format by dividing the country into a Grids of 50 km x 50 km. It was informed that the activity profile of ENVIS Centres have been expanded and strengthened with its involvement in ground truthing of data, monitoring of projects, Sansad Adarsh Gram Yojana(SAGY) and MPLADS Schemes for achieving Intended Nationally Determined Contributions (INDCs) & Sustainable Development Goals (SDGs) targets. The framework of the Scheme has been changed to 'Input - Output - Outcome - Impact' (IOOI) basis. The revamped scheme has been rolled out by Ministry for 3 years i.e. 2017-2020.

During workshop, the exhibition was also organized at the venue by all the Centers including Punjab ENVIS Centre. The Centre displayed posters on state environment and publications in the exhibit. Shri Ajay Nayayan Jha during the visit to Punjab ENVIS stall appreciated its publications.

Development of Knowledge Products



Newsletter titled “The State Bird of Punjab: Northern goshawk” (Vol. 14, Issue No. 3) was published by the ENVIS Centre. The article discussed the brief history of recognition of state bird in Punjab. It presented significance & the cultural association of Northern goshawk or Baaz in the state. It covered the general facts related to Northern goshawk such as its name & classification, physical characteristics, habitat, global distribution and some interesting features of the bird. This publication was an effort to give due importance to the bird for being recognized as the state bird of Punjab and to motivate the concerned departments/organizations to take concerted efforts and initiative for its habitat management and viable population in the region.



Pamphlet

The Pamphlet covers the achievements, initiatives & activities of the Punjab ENVIS Centre, Punjab State Council for Science & Technology.

News

World Bank approves funding for India’s ambitious National Hydrology Project

The World Bank has approved $175 million for India’s National Hydrology Project which will strengthen the capacity of existing institutions to assess the water situation and equip them with real-time flood forecast systems across the country.

Apart from helping states that have already benefited from the earlier projects to further upgrade and complete their monitoring networks, the national project will also help new states to better manage water flows from the reservoirs.

The move will help in reducing the vulnerability of many regions to recurring floods and droughts as absence of real-time ground information for the entire country creates difficulties in issuing alerts on time. The entire project, worth over Rs 3679 crore, will be implemented by 2023-24. The World Bank will provide financial assistance for nearly 50% of its total cost.

The National Hydrology Project, approved by the World Bank Board on Wednesday, will build on the success of India’s earlier projects - Hydrology Project-I and Hydrology Project-II - which had led to real-time flood forecast systems integrated with weather forecast in two large river systems (Krishna in South India and Satluj-Beas in north-west India) to give reservoir managers an accurate picture of the water situation in their region.

This national project will now scale up the successes achieved under HP-I and HP-II to cover the entire country, including the states of Ganga, and Brahmaputra-Barak basins.

"In the context of climate change, advanced flood management and enhanced river basin planning are essential for building livelihoods and sustaining economic growth. This project has the potential to help communities to plan in advance to build resilience against possible uncertainties of climate change," said Junaid Ahmad, World Bank's country director in India.

The National Hydrology Project was approved by the Union cabinet in April last year as a central sector scheme with a total outlay of Rs 3679 crore. While Rs 3,640 crore will be spent for the national project, remaining Rs 39 crore will be used for establishment of the National Water Informatics Center as a repository of nation-wide water resources data.

The Project is meant to help the states monitor all the important aspects of the hydro-meteorological cycle and adopt the procedures laid out in the earlier projects. It includes measures like how much rain or snow has fallen right in the catchments of rivers, how rapidly the snow will melt, the speed with which the water is flowing, how much silt has built up, how much water will reach the reservoir, and how soon it will do so.

"Based on our experience over the last 20 years in establishing Hydrological Information Systems in southern India and in Himachal Pradesh and Punjab, both national and state governments are now committed to an integrated river basin planning and management. This Project responds to this demand by extending its reach to cover the entire country," said Anju Gaur, senior water resources specialist and World Bank's Task Team Leader for the Project.

According to the Union water resources ministry, the Project is aimed at improving the extent, quality, and accessibility of water resources information, decision support system for floods and basin level resource assessment/planning and to strengthen the capacity of targeted water resources professionals and management institutions in India.

Source: *March 16, 2017, The Times of India*

At least 63 million in India do not have access to clean water

India has the maximum number of people — 63 million — living in rural areas without access to clean water, according to a new global report released to mark World Water Day tomorrow.

This is almost the population of the United Kingdom, said "Wild Water", a report on the state of the world's water.

Lack of government planning, competing demands, rising population and water-draining agricultural practices are all placing increasing strain on water, said the WaterAid's report.

Without access to clean water, 63 million people are living in rural areas in India. Diseases such as cholera, blinding trachoma, malaria and dengue are expected to become more common and malnutrition more prevalent, it said.

Rural communities dependent on farming to make a living will struggle to grow food and feed livestock amid soaring temperatures, and women — typically responsible for collecting water — may have to walk even greater distances during prolonged dry seasons, the report forewarned.

Describing India as one of the world's fastest growing economies, it said ensuring water security for the growing population is one of the main challenges facing the country.

According to India's official Ground Water Resources Assessment, more than one-sixth of the country's groundwater supply is currently overused.

"Droughts have become almost a way of life in the Bundelkhand region of North-Central India. Here, three consecutive droughts have pushed millions of people into a vicious cycle of hunger and poverty," it said.

The report warns about the implications of extreme weather events and climate change for the world's poorest.

"India ranks in the top 38 per cent of countries world wide most vulnerable to climate change and least ready to adapt, according to the Notre Dame Global Adaptation Index.

"With 67 per cent of the country's population living in rural areas and 7 per cent of the rural population even now living without access to clean water, India's rural poor are highly vulnerable to the effects of extreme weather events and climate change," it said.

The report said today, 663 million people globally are without clean water and the vast majority of them –- 522 million -– live in rural areas.

According to WaterAid India's Chief Executive VK Madhavan, with 27 out of the 35 states and union territories in India disaster prone, poorest and the most marginalised across the country will bear the brunt of extreme weather events and climate change and will find it the hardest to adapt.

"This World Water Day, WaterAid is calling on the government to deliver its promise to meet the Sustainable Development Goals, including ensuring access to safe water as part of Goal 6 to everyone, everywhere.

"Along with access to safe water, it is critical that communities have the necessary tools, infrastructure and preparedness to deal with the effects of extreme weather events and climate change", he said in a statement.

"These communities face particular challenges in gaining access to water due to isolated locations, inadequate infrastructure and a continued lack of funding," he said.

Source *: March 21, 2017, Indian Express*

Extreme and unusual weather in 2017: UN weather agency

Extreme weather and climate conditions, including Arctic "heatwaves", have continued into 2017, after global temperatures set record last year and the world witnessed exceptionally low sea ice and unabated ocean heat, the UN weather agency said.

While global temperatures hit a remarkable 1.1 degree- Celsius above the pre-industrial period, global sea-level touch record highs and the planet's sea-ice coverage dropped more than four million square kilometres below average in November - an unprecedented anomaly for that month, according to the World Meteorological Organisation's (WMO) statement on the state of the Global Climate in 2016.

"This increase in global temperature is consistent with other changes occurring in the climate system," WMO Secretary-General Petteri Taalas said.

"With levels of carbon dioxide in the atmosphere consistently breaking new records, the influence of human activities on the climate system has become more and more evident," Taalas said.

Each of the year since 2001 has seen at least 0.4 degree-Celsius above the long-term average for the 1961-1990 base period, used by the UN agency as a reference for climate change monitoring.

The 2016 heating was further boosted by the powerful El Nino weather system, during which global sea-level also rose very strongly.

Similarly, carbon dioxide (CO2) levels in the atmosphere reached the symbolic benchmark of 400 parts per millions in 2015 - the latest year for which WMO global figures are available - and will not fall below that level for many generations to come because of the long-lasting nature of CO_2.

"The extreme weather patterns are continuing in 2017 adding that at least three times so far this winter, the Arctic saw what can be called the Polar equivalent of a heatwave, with powerful Atlantic storms driving an influx of warm, moist air," WMO said.

"This meant that at the height of the Arctic winter and the sea ice refreezing period, there were days which were actually close to melting point," it said.

In the US alone, 11,743 warm temperature records were broken or tied in February, according to the US National Oceanic and Atmospheric Administration, said the UN agency.

"Even without a strong El Nino in 2017, we are seeing other remarkable changes across the planet that are challenging the limits of our understanding of the climate system," said World Climate Research Programme Director David Carlson.

"We are now in truly uncharted territory," Carlson added.

Source: *March 23, 2017, The Times of India*

Important Events

- **International Conference on Contemporary Issues in Integrating Climate-The Emerging Areas of Agriculture, Horticulture, Biodiversity, Forestry; Engineering Technology, Applied Science (Agrotech-2017)**
  11th to 12th May 2017
  Location: Kalimpong, West Bengal, India
  Website : www.krishisanskriti.org
  Contact person: Dr. G.C. Mishra
  Organized by: Himalayan Scientific Society for Fundamental and Applied Research & Krishi Sanskriti & Uttar Banga Krishi Viswavidyalaya

- **18th International Conference on Envirotech, Cleantech & Greentech (ECG)**
  9th to 10th June 2017
  Location: Rome, Italy
  Website: http://wasrti.org
  Contact person: Dr. Vivian L
  Venue: University of Washington - Rome Center (UWRC), Roma, Italy
  Organized by: WASRTI – World Association for Scientific Research and Technical Innovation

- **2017 International Conference on Sustainable Energy Engineering (ICSEE 2017)**
  12th to 14th June 2017
  Location: Perth, Australia
  Website: www.icsee.org
  Contact person: Ms. Veronica Reed
  Organized by: ICSEE Energy Committees

Contact Us

Address : Punjab ENVIS Centre, Punjab State Council for Science & Technology, MGSIPA Complex, Institutional Area, Sector 26, Chandigarh - 160 019,

Phones : 0172-2792325, 2795001 , Fax : 0172-2793143, Email : pun-envis@nic.in