### Climate science literacy: scope for Anglican colleges towards mitigation and adaptation through innovation inclusive education

#### ANTHROPOCENE – AN ANTHROPOGENIC PERCEPTION

The Anthropocene Epoch is an unofficial unit of geologic time, used to describe the most recent period in Earth's history when human activity started to have a significant impact on the planet's climate and ecosystems

#### WHAT IS THE ISSUE ON HAND IN PROMOTING CLIMATE SCIENCE LITERACY?

- In the US, 31% of teachers pass on mixed ideas on the anthropogenic cause of climate change, e.g., emphasizing both the general consensus of scientists as well as leaving open the possibility of natural causes for global climate change (Plutzer et al., 2016).
- In a survey of American adults (August 15–25, 2014), 50% of respondents were not convinced that human activities were mainly responsible for climate change (Funk and Rainie, 2015)

# **Biblical Perspective**

#### PRESERVATION THROUGH MITIGATION AND ADAPTATION GENESIS 2:15: STEWARDSHIP TOWARDS PRESERVING EARTH

#### HYBRIDIZING THE BIBLICAL PERSPECTIVE: A POTENTIAL ROLE OF ANGLICAN COLLEGES

#### Relationships

- (a) between human beings and the rest of creation;
- (b) between God and nature;
- (c) between Sovereignity and human responsibility;
- (d) among human communities globally



Edited by Karen L. Bloomquist

#### **CLIMATE EDUCATION: CURRICULUM FRAMEWORK**

- Education systems do not currently address the gravity of the climate crisis, warns the UNESCO, the UN's leading education agency, ahead of the first joint meeting of environment and education ministers at COP<sub>26</sub> in Glasgow on 5 November.
- New UNESCO data from 100 countries shows that only 53% of the world's national education curricula make any reference to climate change and when the subject is mentioned, it is almost always given very low priority.

https://en.unesco.org/news/only-half-national-curricula-world-have-reference-climate-changeunesco-warns (31/10.2021)

#### PEDAGOGICAL CRISIS: TEACHING CLIMATE SCIENCE

### 30% of the 58,000 teachers surveyed reported that they were not familiar with suitable pedagogies - UNESCO

https://en.unesco.org/news/only-half-national-curricula-world-have-reference-climate-changeunesco-warns

#### KNOWING ABOUT CLIMATE SCIENCE....?

- "Knowing more about science does not seem to straightforwardly predict <u>concern</u> about climate change."
- Psychology
- Science literacy and climate views
- <u>Adam Corner</u>
- *Nature Climate Change* volume 2, pages710–711 (2012)

#### WHERE LIES THE PROBLEM?

- Lack of conviction on the Anthropogenic intervention as a cause for Climate Change among students and teachers
- Socio-Political barriers needs to be overcome to internalize the urge to act on Climate Change
- Gen Z as demographic variant alienated for lack of pedagogy?
- Simple Acquaintance of Climate Science knowledge would not convince and internalize the fact
- Community and Context engagement through innovation and the consequent emergence of conviction

# WHAT IS INNOVATION?



CLIMATE CHANGE AND ADAPTIVE INNOVATION A MODEL FOR SOCIAL WORK PRACTICE

Sunil D. Santha



#### Innovation is not a Discovery or Invention but the Ideations that connect both towards execution

Walter Leal Filho Editor
Innovation
in Climate
Change
Adaptation

**Climate Change Management** 

#### ANGLICAN COLLEGES AS POTENTIAL ECOSYSTEM

- Ecosystem is an environment that
- i) Creates awareness on innovation and scout potential innovators
- ii) Provides Collaborating spaces to ideate Soliciting problem statements from the field
- iii) Builds capacity and provides access to resources , infrastructure and mentorship thus incubating ideations
- iv) Connects Angel Investors to the Innovators , Facilitates patenting, for patronage
- v) Renders opportunity to validate the incubated ideations through prototyping leading to Start-up

#### **SOLVING PROBLEMS THROUGH INNOVATIONS**

**Process Innovations:** Optimization, System Thinking, Designing Protocol, Creating Rubrics etc are the Service oriented Innovations to solve a problem

**Product Innovations:** Designing or fabricating a new product through repurposing, modifying to solve a problem

#### Why Innovation?

#### The Korean Story: Secrets of an Economic Miracle

#### SOUTH KOREA – A CASE STUDY

- For the first half of the twentieth century, it was an agrarian-based Japanese colony, then a battle ground.
- Global Innovation Index, published by Cornell University, INSEAD and the World Intellectual Property Organization, South Korea is at number 11 and Germany is in 9th place among the 129 countries ranked.
- South Korea had the greatest share of researchers who moved from industry to academia in 2017 to 2019 among 71 countries

*Nature* 581, S54-S56 (2020)

#### NEED FOR INNOVATION ECOSYSTEM AND INNOVATION INTEGRATED ACADEMICS

- Facilitates Construction of knowledge by students through community engagement and empathy
- Demands Critical and Creative Thinking by students
- Empathy and Engagement along with critical thinking skills will promote Climate Science Literacy to the level solving problems

#### **NEEDS TO REDEFINE EDUCATION IN COLLEGES?**

## Demographic influx variable in Colleges Academia- Industry engagement among Colleges

#### **GEN Z KIDS AND COLLEGIATE EDUCATION**

 Gen Z kids mostly identify themselves with Innovation



- Their thinking patterns and values are not conventional in its essence
- Collegiate education is reshaped and refined by these Kids
- Solving problems through lateral Thinking

# CULTURE OF INNOVATION TO SOLVE ISSUES

•Need of the hour to integrate "Innovation" as element into the curriculum in Anglican Colleges

•Culture of Innovation is the one which directs the behavioral patterns and values of the students

#### INNOVATION INTEGRATED ACADEMICS – PROPOSED MODEL

Madras Christian College has been making effort in \*Innovation Inclusive Education\* through three levels of Integration

#### **INTERNAL CONTINUOUS ASSESMENT : (Scouting Ideation)**

To assess the ability to innovate in their domain or interdisciplinary domainOutcome: Publication, models, Novel protocol, OptimizationPatronage : Collaborating space, laboratory, resources, mentorRewards: Best Innovator Award and Grades

INTERNSHIPS : (Incubation)Internships\* towards \*incubation\* of innovative ideasOutcome: Acquaintance with tools, skill development, Capacity building, Proof of ConceptPatronage : infrastructure, mentor support,Rewards:Credits and Grades, Idea patenting support

#### **PROJECT WORK :(Start-Up)**

Outcome : Prototyping, Entrepreneurship personality traits (21<sup>st</sup> Century skills) Patronage : mentor , Angel Investor Support, Infrastructure support towards \*start-up\* Rewards : Credits, Grades, Entrepreneurship

#### **RUBRICS FOR ASSESSING INNOVATION**

- 21 st Century Skills
- i) Critical Thinking
- ii) Creativity
- iii) Collaboration
- iv) Communication
- V) Empathy

#### **MCC-MRF INNOVATION PARK**

# MCC to set up innovation park

#### TIMES NEWS NETWORK

Chennai: Madras Christian College has planned to set up an innovation park to identify and groom student innovators and entrepreneurs.

The park, to be spread over 68,636sqft, will have a writer's cafe, entrepreneur's cafe, design studio and openair theatre along with labs for data analytics, computation, psychometrics and instrumentation.

MRF will donate **c**26 crore to build the park which will be one of its kind among liberal arts and science colleges. The foundation stone for the park will be laid on Wednesday.

innovators from various streams of arts and science students and train them on ark entrepreneurship. It will provide them with a collaborative space and ecosystem to nurture their innovative ideas and incubate them," e a said Paul Wilson, principal

of the college.

Park aims to scout potential

"Talents and skills thus incubated will be further taken to the point of startup while they study their courses. These potential entrepreneurs will go out prepared for the outside world. It will be an end-to-end support offered from the innovation park beginning from identifying the talent to shaping them to be potential entrepreneurs," he said.

### MRF donates ₹26 cr to Madras Christian College

#### OUR BUREAU

#### Chennai, March 17

India's leading tyre-maker MRF has contributed ₹26.09 crore to establish the MCC-MRF Innovation Park at the Madras Christian College (MCC) in Chennai.

#### Autonomous centre

The Innovation Centre would be an autonomous centre with high student autonomy in the activities undertaken. The Park seeks to set up collaborative spaces that would facilitate inter, multi and trans-disciplinary innovations, said a statement.

With a proposed built-up area of about 70,000 sq.ft., the Innovation Park will incorporate the biophilic design concept that connects the functional



KM Mammen, Chairman of MRF

spaces with the surrounding natural environment. "If you look at history, innovation doesn't come just from giving people incentives; it comes from creating environments where their ideas can connect. MRF is proud to join hands with MCC to help create such an environment in this esteemed institution" said KM Mammen, Chairman of MRF, while making the announcement on company's contribution at a function at MCC.

The Innovation Park will also host spaces for Writer's café, Design studio (Tinkering lab) and entrepreneurship Café amongst others. Active learning spaces are designed for conducting workshops to impart hands-on experience and collaboration.

An open air theatre for performing arts will come up in the centre of the innovation park. It will also host computer-based infrastructure, including data analytics lab, computational science lab, psychometric lab, media science lab, and instrumentation lab. "Entrepreneurship and employability hold the key in defining a large portion of an educational institution's success on how its curriculum has helped students in the real world. It is important that students have a seamless transition from the academic world to the world of work. Projects such as the Innovation Park will help students in this transition, said Arun Mammen, Vice-Chairman of MRF.

"The Park would serve as a haven for innovation, incubation and start-ups. We are confident that this project will serve as a fertile breeding ground for innovations and incubate entrepreneurship in the coming years," said Paul Wilson, Principal of Madras Christian College.

"MCC-MRF Innovation



#### SUSTAINABLE INSTITUTIONAL PRACTICES

#### **GOVERNANCE AND POLICY**

#### **Plastic Free Campus**

Food outlets to use edible cutlery to minimize the use of plastic



#### EXCHANGE OF PET BOTTLES FOR A T SHIRT

- A programme initiated by Institution Innovation Council and the Department of social work
- PET bottle Collection Drive organized for recycling



#### **CREATE AWARENESS AND CAMPAIGN FOR THE CHANGE**

Public engagement
Cemtre for Media Studies involved in various campaigns
Theatre group in the College street plays

#### **INCENTIVIZATION OF CLIMATE CHANGE RESEARCH**

 Sciences: Soliciting Project Proposals and Patronize
 Humanities & Social Sciences: Drafting Policies using Informatics and Data analytics

### SCRUB SOCIETY - REFORESTATION

- Prof. Edward Barnes Tree Plantation Drive to replenish the lost trees
- Strategy:
- i) "green infrastructure" water-smart landscaping features
- Ii) Native plant species are preferred over the exotics as they require less water and withstand even during harsh weather (i.e. months of March, April and May)
- Iii) The undisturbed forest patches that are in the rear end of the campus are undisturbed for any developmental activities
- iv) Infrastructural planning in the main areas are done with ecological/ environmental sense.

#### CONSERVING BIODIVERSITY – MITIGATION EFFORT

- Unique microclimatic environment when compared to the surrounding
- Natural seed dispersers like birds, mammals like bonnet macaque, bat, civet cat, Squirrel etc. promote the seed dispersal and regeneration of forest.
- The dense vegetation of the campus aids in reducing the ambient temperature significantly that is felt by many.



#### **Indian Porcupine**

#### • Black naped hare



#### **RARE MIGRANT BIRDS**



#### ASIAN PARADISE FLYCATCHE R



#### BLUE THROATED FLYCATCHER

#### **Chesnut-tailed Starling**

#### INDIAN PITTA







#### Indian Scops-Owl



#### **JACKAL AND JUNGLE CAT**



#### **GENERATING POWER ON CAMPUS**

 Mitigating measures to employ alternative ways of harvesting energy



 Tropical dry evergreen and tropical thorny
 scrub vegetation in the campus remain green throughout
 the year due to the presence of a water
 body. This acts as a heat sink for this habitat.



#### -TEN WELLS IN 320 ACRES

#### PROPOSED TO CREATE MORE WATER BODIES BASED ON HYDROINFORMATICS



#### **INNOVATION AS TOOL FOR MITIGATION**

- Adaptation of hydro informatics to hydrology A student faculty initiative
- Hydroinformatics based Decisions,
- Designing : Irrigation Schemes, Artificial water bodies based on informatics
- Predictions for Water governance in side the campus
- Micro research grant already sanctioned

#### MITIGATION: SUSTAINABLE CONSTRUCTION PROPOSED

- Majority of buildings are constructed spreading wide and not too high with planned means to avoid stagnation of water, seepage of rainwater or cyclones
- Campus could withstand recent floods due to its inherent design
- **Biophilic Design** a Prospective model envisaged for the construction of MCC- MRF Innovation Park at Madras Christian College

## WILDLIFE CONSERVATION CLUB

### Dog-Deer Conflict management

#### HYDROCLIMAPONICS – NEW INVENTION TO HELP REDUCE CLIMATE CHANGE EFFECTS – CAN COLLEGES CAN TRY OUT?



Relatively more water conservation compared to current hydroponic systems.

More efficient use of climate, water and CO2, our system is able to grow 700 plants per square meter compared to 250-400 plants per square meter in any other hydroponic system, with less inputs."



#### REDUCE

"REMOVE" IS THE PROSPECTIVE PHILOSOPHY TOWARDS CO, EMISSIONS



### DIRECT AIR CAPTURE TECHNOLOGY

- about 30% of Emissions come from industry.
- Direct air capture plants globally are removing about 9,000 tons of carbon dioxide from the air annually, according to the International Energy Agency.
- At Climeworks' Orca plant near Reykjavik, fans suck air into big, black collection boxes where the carbon dioxide accumulates on a filter. Then it's heated with geothermal energy and is combined with water and pumped deep underground into basalt rock formations. Within a few years, Climeworks says, the carbon dioxide turns into stone.

**Carbon Engineering: Direct Air Capture Technology, Climeworks, World's largest Carbon capture Plant** 



#### WHAT SHALL WE SAY THEN?

- Climate Science Literacy can be realized meaningfully only if a constructivist, emphathetic, context based community engagement is used as a Pedagogy
- "Culture of Innovation" that incentivizes the problem solving approach needs to be inculcated
- An appropriated education model integrated with innovation needs to be developed for higher education institutions
- Value proposition towards Climate smart Institutional Practices
- Student Autonomy and innovation sail together

# THANKYOU