SAMUCHIT ENVIRO TECH-INECC-LAYA

Trainers' Manual on
Games and Activities for
Sustainable Development Goals
& Climate Change
For Children & Youth

Preamble

We were pleased when we were approached by 'Pratyek' to create this manual. The manual comes at the perfect time. Building an inclusive environmental community that spans economic status, race, ethnicity, religion, and gender cannot wait. We would all be well advised to look to our own organizations and activities to see where improvements can be made, interests fostered, and real dialogue and collaboration developed.

The public's renewed focus on environmental concerns, from climate change and clean energy to biodiversity loss and deforestation, provides a special opportunity to create a re-energized environmental community full of collaboration and inclusion. These issues can no longer be thought of as a concern of only the wealthiest of mainstream Indians. These issues affect all of us, and the solutions lie in our ability to bring as many people into the environmental community as possible. That will only happen if we broaden the agenda to encompass the concerns and needs of minority, marginalized and underserved communities.

We at the Indian Network on Ethics and Climate Change (INECC) have recognized the importance of inclusion and diversity. We also have a strong vision in training future environmental leaders. To this end, we are working to provide not only an inclusive learning environment, but also information rich in diverse subjects related to sustainable development and climate change which is culturally and locally relevant. We are the first to acknowledge that we are not yet where we should be. What we like most about this manual is its potential for impact across most communities. The activities outlined are easily relatable and explainable. We are confident that users of this manual will benefit from the activities provided as well as the children who will be participating.

We are grateful to Ragavi C., M. Arch. student of D Y Patil School of Architecture, Pune for some of the schematic images, and Isha Bhate for the Ecosystem Puzzles game.

The Authors

Sustainability and SDG framework

Sustainability is about how do we humans manage to create a respectable quality of life for each one of us, within the limits of the resources available on the Earth. Thus, sustainability is not about protecting the environment at the expense of humans, and it is not about allowing access to resources to the rich who can afford to pay for the damage. The principles of social justice and equity as well as conservation of ecosystems are all integral to the idea of sustainability. However, global climate change has added another dimension to the humanity's sustainability challenge. Climate change has increased the frequency and intensity of natural disasters, which leads to reducing quality of life and in some cases reducing life spans, particularly for the poor and vulnerable populations living in underdeveloped and inaccessible parts of the world. Climate change also disrupts natural cycles, and therefore has an adverse impact on the natural processes of regeneration and redistribution of resources that we have evolved with, as a species. For example, climate change has caused a disruption of the monsoon cycle, which is leading to many areas of India facing severe droughts or excessive rainfall or even both at the same location at different times of the annual cycle. This is impacting agricultural productivity and putting our food security under threat.

All of the above concerns are reflected in the Sustainable Development Goals (SDG) framework set up by the United Nations in 2015. Sustainable Development Goals is a set of 17 goals with multiple targets under each goal. The targets are set in such terms that progress on the targets can be measured using a number of quantifiable indicators. The United Nations has given the time period of 2015 to 2030 to all the nations in the world to achieve the targets, so as to create a just, equitable, and peaceful global human civilisation on a planet that has a healthy and thriving biospehere and an atmosphere and ecology that are amenable for life in general, and human life in particular.

Understanding Sustainability and SDGs through Games and Group Activities

When it comes to operationalising sustainability principles in day to day activities, and internalising sustainability thinking in our decision-making processes, rigour of understanding definitions intellectually is not enough. Games and group activities can play an important role in creating an instinctive feel for sustainability principles. Further knowledge and understanding may be built on this through discussions, readings, interactions with experts, etc. In the following sections we suggest a few games and activities focused on developing an understanding of Sustainability and SDGs.

Game 01: Know Your Goals!

(Note: This game is a variation on the 'Go Goals!' board game which is based on snakes and ladder format. We feel that the chance element in snakes and ladders that may take a player close to the end point and leave another player languishing near the start point just on the basis of a throw of dice goes against the spirit of SDGs - Leave No One Behind. Therefore we are not recommending to use the game as it is. However, the quiz part of the 'Go Goals!' game is good for developing a basic understanding of the 17 goals. Therefore we are proposing another game based on the same quiz cards as used in the 'Go Goals!' game.)

Objective: Gain basic knowledge about the SDGs.

Materials: Chits with numbers 1 to 17, Quiz question cards (17 goals x 5 questions = 85 cards. These may be downloaded from: https://go-goals.org/downloadable-material/), A chart paper that is divided into 16 rows, one for each year from 2015 to 2030, tokens (these can be stones, or leaves, or pieces of coloured papers or chalks, or plastic tokens used in many board games, etc.)

Age Group: 10 yr+

Description:

This game is based on a quiz consisting of 5 questions around each goal, that focus on the conditions that highlight the importance of the goal, and the solutions that would help achieve the goal.

The game may be played with individual contestants or teams of 2-3-4 persons competing against each other. Especially if there is a lot of age variation in the group, it is better to make teams where each team contains the range of ages present in the group. The very young children may be given the tasks of picking up a numbered chit, picking up cards, etc.

The game starts with each contestant (or team) choosing a token to represent him/her and placing that token on the chart paper in the row for year 2015.

A contestant picks up a chit to find a number. The contestant is then offered the stack of question cards for that goal number. The contestant will randomly pick up a card. The quiz master will read out the question from the card, and the contestant will give an answer. If the answer is correct, the contestant's token will be moved up by two years. If the answer is wrong, the next contestant will get a chance to answer the question. If his/her answer is right, his/her token will be moved up by one year. If not, the question will pass to the next contestant. Thus, each contestant will move up by two years if they correctly answer the

question first addressed to them, and by one year if they correctly answer the question passed on to them. The game ends when one contestant reaches Year 2030.

YEAR	Contestant 1	Contestant 2	Contestant 3	Contestant 4
2015				
2016				
2017				
2018				
2019				
2020				
2021				
2022				
2023				
2024				
2025				
2026				
2027				
2028				
2029				
2030				

Game Board

Discussion:

The objective of the game is just to familiarise people with the 17 SDGs and their basic rationale and way forward. The discussion may focus on some of the questions that nobody could answer correctly. The discussion may also emphasise how understanding the goals is important to achieving them as per the time schedule.

The game may be made a bit more challenging by bringing in the concept of negative marking for wrong answers. Thus, while a correct answer will advance a token by two years, a wrong answer will step a token back by one year. The discussion may focus on how some countries seem to be going back rather than forward on some of the goals - especially those around peace, justice and strong institutions, gender equality, social justice, etc. If the participants are not aware of international scenario, the discussion may focus on what they think is happening in their own communities on the issues addressed by the different goals - which are the goals on which the community seems to be making progress, and which are the goals on which there seems to be a slide down. The participants may try to find the causes for the successes and failures at the level of their community or neighbourhood.

Another possible variation could be to have three different rounds with goals related to the three pillars of sustainability - social wellbeing, economic prosperity, preservation of environment. This will help bring out the relationships between the SDGs, such as how protecting health and wellbeing is linked with reducing hunger (as a contributing factor) and reducing poverty (as a factor contributed to), and so on.

Game 02: Drain or Sustain

Objective: To understand how individual thinking processes impact an individual's as well as community's chances of surviving in the face of resource limitations and climate change.

Age group:16 yr +

Materials: Tokens (these can be stones, or leaves, or pieces of coloured papers or chalks, or plastic tokens used in many board games, etc.), coin for toss.

Number of people: Everyone may be able to participate in the game if you have a group of up to 20 persons, and total time available is around 1 hr. Alternatively, 8-10 people in the group may actually play the game while the others observe. The discussion can involve everyone. This will take about 20-30 min.

Description:

The game must be played by at least two groups. There may be 4-5 participants in each group. Each group gets 20 tokens to start with, followed by at least two more rounds which are explained below. There are two rules in the game:

1. Each person has to pick up at least one token for survival in each round; there is no limit on how many tokens are being picked up by a person.

2. The members of the group cannot communicate with each other. Each person is playing the game for himself/herself.

Once each participant has picked up the tokens from the first offer of 20 tokens, see how many tokens are remaining in the set. Toss a coin. If the toss gives HEADS double the number of tokens in the set. If the toss gives TAILS, add only half as many tokens as are left in the set. Thus, for example, in a group of four persons, if 5 tokens are left after everyone has picked up tokens as per their wish, and the toss of the coin yields TAILS. Then the set is supposed to get half of 5, i.e., 2.5 tokens, but since we do not have half token, the set will get only 2 tokens. The set for the next round will thus have 7 tokens. On the other hand, if the toss yields HEADS, the set will get as many tokens as are left, i.e., 5 tokens, so that for the next round the set will have 10 tokens.
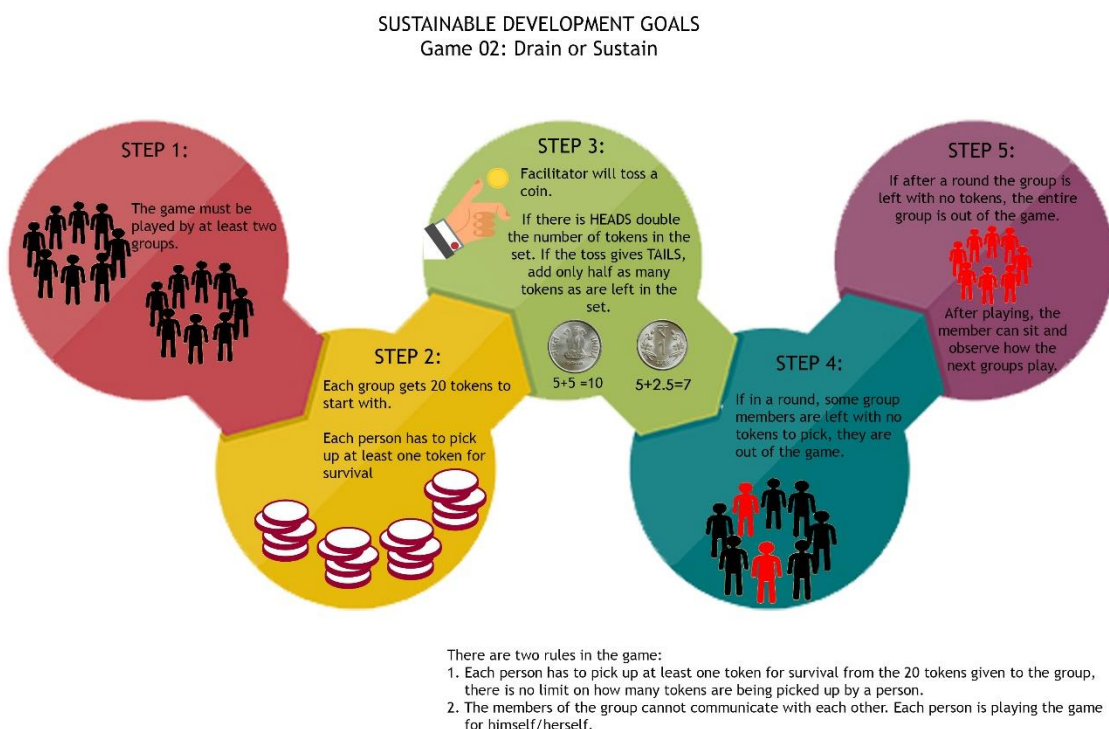
The group members then again take their pick of tokens from the set offered to them, and the process of tossing a coin, and adding tokens based on outcome of the toss is repeated for the third round.

Each group may play 3 or 4 rounds depending on time available. If in a round, some group members are left with no tokens to pick, they are out of the game. If after a round the group is left with no tokens, the entire group is out of the game.

The groups may all play simultaneously side by side. In that case, each group will need a monitor to ensure that they are playing by the rules, to toss the coin, and offer them new tokens on the basis of the toss, etc. Alternatively, all the players may be asked to leave the room, each group is brought in one by one, plays the game of 3 or 4 rounds (all groups must play the same number of rounds, unless they are out due to exhausting all the tokens in their set). After playing, the members can sit and observe how the next groups play without communicating with each other.

Note to the Trainer: The participants will be given only the description of what to do in the game. There should be no input given on what constitutes as a 'win' at the start of the game. Let the participants draw their own conclusions as to what may be considered as a 'win'.

If there are more than 2-3 groups, it would be good if each group is also assigned a note taker who notes down how many tokens were picked up by each person in each round.

SUSTAINABLE DEVELOPMENT GOALS
Game 02: Drain or Sustain

STEP 1:
The game must be played by at least two groups.

STEP 2:
Each group gets 20 tokens to start with.
Each person has to pick up at least one token for survival

STEP 3:
Facilitator will toss a coin.
If there is HEADS double the number of tokens in the set. If the toss gives TAILS, add only half as many tokens as are left in the set.
5+5 =10   5+2.5=7

STEP 4:
If in a round, some group members are left with no tokens to pick, they are out of the game.

STEP 5:
If after a round the group is left with no tokens, the entire group is out of the game.
After playing, the member can sit and observe how the next groups play.

There are two rules in the game:
1. Each person has to pick up at least one token for survival from the 20 tokens given to the group, there is no limit on how many tokens are being picked up by a person.
2. The members of the group cannot communicate with each other. Each person is playing the game for himself/herself.

Drain or Sustain: Game Description

Points for discussion:

Ask players to volunteer information on how did they decide on the number of tokens to pick up in each round that they played. If there is sufficient time and relatively small number of

players, ensure that each person shares his/her analysis of his/her own play. If not, a few people sharing is good enough to get the discussion going.

Discussion should focus on recasting the analysis of the players' game plans with the assumption that the tokens represent a renewable resource. One token per round (which could be one year or one generation) represents the basic minimum requirement for survival for a person. Tossing a coin between years or generations represents uncertainty introduced by climate change. This directly impacts the rate at which the resource renews from year to year or generation to generation. Thus, for example, the resource was supposed to double every year, but sometimes (if the toss of the coin gives TAILS) it grows by only half of what was expected. The group is a representation of a community and no communication between group members is symbolic of how different members of the community only look after their own interests.

The game basically brings out how a community as a whole may deal with an access to a resource, through the actions of its individual members.

The game can also be used for emphasising the importance of communication. The players may be asked to introspect on what would have been the outcome of the game, had they been allowed to communicate with their team members?

If one wants to emphasise the importance of communication in resource sharing, a variation may also be tried out as follows.

1. One group plays the game with no communication between members.

2. Second group is allowed to discuss and strategize for each round.

3. In the third group, assign a leader who will tell everyone what they should do in each round. There will be no other discussion, but individual players may choose not to follow the direction given by the leader. One can also bring in the gender aspect by setting up one group with a male leader and one with a female leader.

Although this game can be played without defining the resource just to develop an understanding of how sustainability can be ensured or threatened by the group dynamics in a community, this discussion may be more focused by taking the example of a specific resource such as water, energy, food, etc.

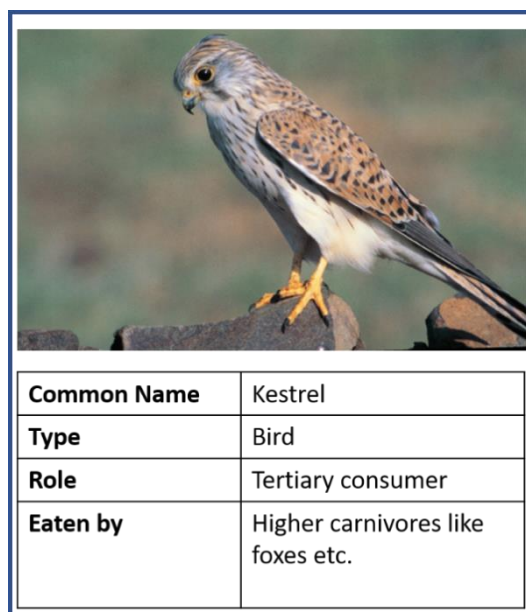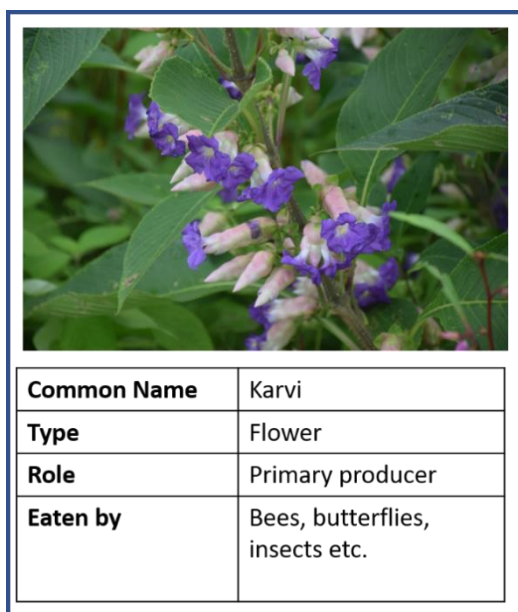# Activities Focused on Specific SDGs

1. Food Web - SDG 14 and 15 (Life on Land and Life below water)

Objective: To understand life on land and below water and how it responds to external shocks.

Age group: 10 yr +

Materials: Bundle of string, at least 8-10 participants. Cards with names and some information of trees, flowers, birds, insects, animals etc. Preferably make cards of food chain members found in the local ecosystem.

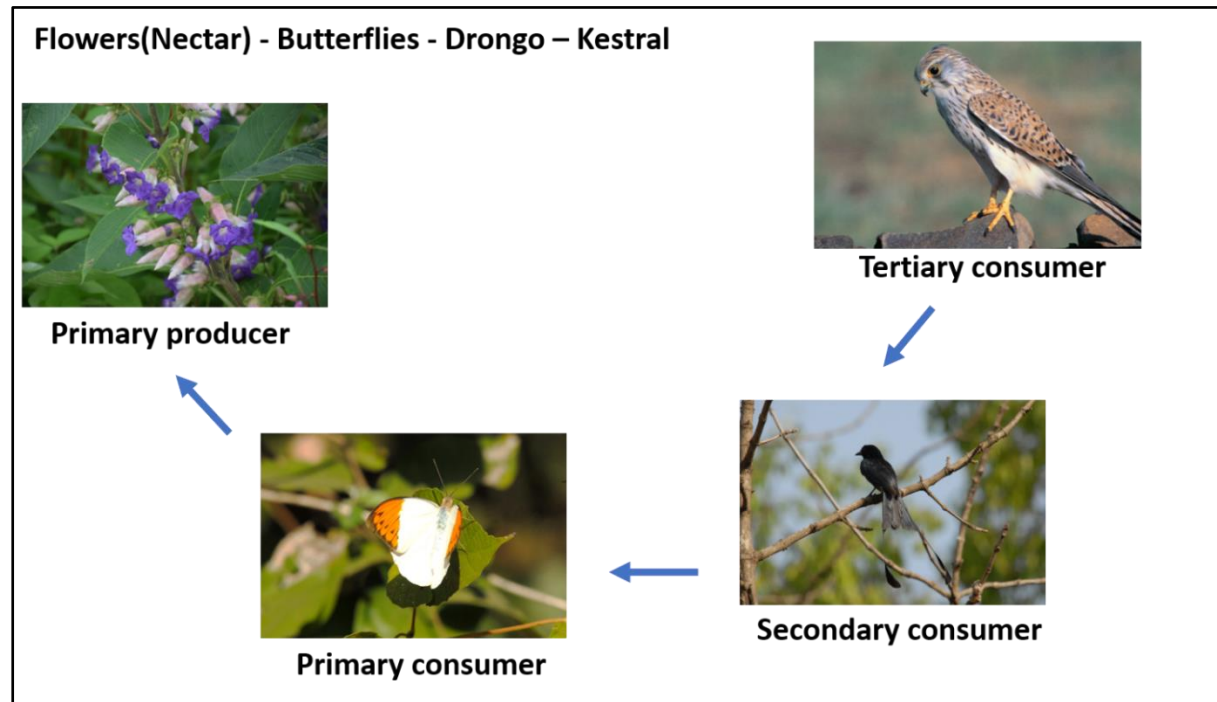(Younger children may be involved in making the cards with pictures, some description of the species, etc.)

Common Name	Karvi
Type	Flower
Role	Primary producer
Eaten by	Bees, butterflies, insects etc.

Common Name	Kestrel
Type	Bird
Role	Tertiary consumer
Eaten by	Higher carnivores like foxes etc.

Examples of Species Cards

Description:

All the participants sit in a circle facing inwards. Each player picks up a card form a stack of cards with the names and descriptions of the food chain members. The facilitator calls the name of the first species in the food chain. The participant with that card identifies himself/herself and reads out the information on the card and shows the picture to the group. He/she then holds one end of a ball of string. The facilitator then calls the name of the second species in the chain, and member with the corresponding card identifies himself/herself and shares information on the species with the group. The first participant then throws the ball of

strings to this second member. In this way, the facilitator calls out the names of the species in the correct order of the food chain, corresponding members share information about each species using the card in each one's hand, and throw the ball of string to the next member after the facilitator calls. A web will be formed as the ball of string goes around the group sitting in a circle.

Flowers(Nectar) - Butterflies - Drongo – Kestral

Primary producer

Tertiary consumer

Primary consumer

Secondary consumer

Algae – Shrimp – Mackerel – Tuna

Primary producer

Tertiary consumer

Primary consumer

Secondary consumer
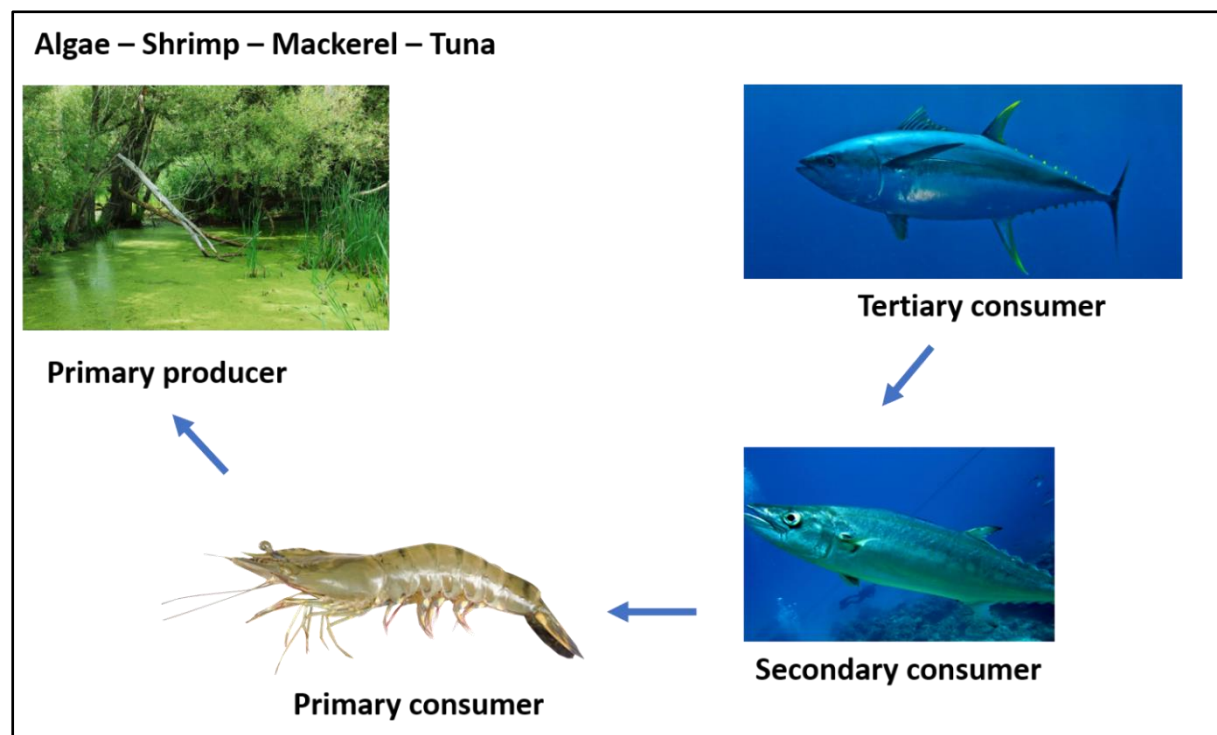
Food Chains on Land and In Water

Discussion:

The discussion may start off while the game is being played as the participants share information of the species they represent from the card in their hands. The facilitator may invite members of the group to add to the basic information being given on the basis of their own personal experience/interaction with the species.

Subsequent to the creation of the web, there may be a discussion on what type of external shocks in the local ecosystem may have various impacts (positive as well as negative) on the food web. The external shocks are of two types - human induced (e.g., construction of a dam upstream will reduce the flow of water in a river and will impact an aquatic food chain in the river) and natural (e.g., a cyclone may uproot trees and destroy nesting sites of birds leading to an impact on the local food chain). The external shocks need not always have a negative impact. For example, flooding of a river may result into fertile riverbed sediment being deposited on the river bank, leading to better growth of grasses, thereby producing more food for the local insects and herbivores, etc.

Climate change will also have some local effects leading to positive or negative impacts for the local food chains. For example, excessive rainfall leading to landslides will destroy vegetation and deprive insects and herbivores of food, rising sea-levels causing erosion of sea shore will impact a mangrove-based food chain, etc. These may also be discussed on similar lines.

A suggested variation of the activity to highlight the impact of external shocks is as follows:

Make a series of cards to represent:

    a. Manmade external shocks

    b. Natural external shocks

    c. Climate change based external shocks.

Each player picks up a card one by one. The player reads out the external shock written on the card and announce the species that he/she is representing, and make a guess at the impact of the shock on that specific species. Other players may also help with their inputs. When everyone agrees on the impact, if the impact is negative, the string held by the player will be slightly cut, weakening the link. If the impact is positive, a knot may be made, strengthening the link. So as the cards go around the circle a couple of times, some links may get totally broken up, and the impacts on the food chain may be discussed.

This variation of the activity will also allow a discussion of how ecosystems are impacted more when multiple external shocks come together. This may be used for discussing some actual crises experienced in the location. For example, dam on a river creates a large reservoir. If

there is excessive rainfall, the water has to be released leading to excessive flooding. Or if there has been an encroachment on hill slopes denuding the slopes of forest cover, excessive rainfall will induce massive landslides.

Some discussion may also focus on how the males, females and young ones of each species are likely to be affected differently by various external shocks. This however will require more detailed information on the social/familial structures prevalent in different species.

2. Ecosystems Jigsaw puzzle SDG 11 (Sustainable cities and communities), SDG 13 (Climate Action), SDG 14 and 15 (Life on Land and Life below water)

Objective: Understanding your ecosystems since everything is interdependent in any ecosystem.

Age group: 9 yr+

Materials: Jigsaw puzzles of ecosystems

Description:

The jigsaw puzzle set has different panels depicting ecosystems in our environment. One set shows pictures of pre-industrialised world, and the second set shows the damage caused by 'development'. When all panels are put together, a huge story is formed, nearly 800 pieces, showing the widespread impact of development and subsequent climate change.

The participants can work in groups, each group putting together one puzzle. Each puzzle should take not more than 15-20 min. The paired puzzles showing 'before' and 'after' pictures of the same ecosystem are then placed side by side for everyone to examine and introspect on.

Jigsaw puzzle may be a totally new activity for many participants. They may need some help in getting a hang of how to put it together. These puzzles are to be put together without looking at the final picture that will emerge.

Ecosystems jigsaw puzzle game

Discussion:

Doing puzzles in a group, involves attention, fosters discussions and may inspire action. The discussion can focus on the following points:

The eco systems jigsaw puzzles set is made with an idea to portray a conscious picture of our ecosystems from mountain to ocean to the participants, to help them understand how each entity is interconnected to different entities in our environment. The two contrasting images

of each ecosystem shows that we may not see all the ecosystems around us on a daily basis but they are affecting us and we are affecting them. It also brings home how our environment is self-sustainable and how human interference is now disturbing and damaging these intricate links, ultimately contributing to climate change and there by putting our own existence in danger.

This discussion should help the participants to arrive at some must dos and don'ts in everyday life to tackle climate change.

3. Energy Services - SDG 7 (Clean and Affordable Energy for All)

Objective: To understand access to energy services.

Age group: 10 yr +

Materials: Chart papers, marker pens.

Description:

The participants can work in groups of 3-4 persons, and each group should have members across the age spectrum of the group. Members of each group have to discuss and figure out:

a. What are the various energy services being availed by the community (e.g., lighting, cooking, grinding grain, filling air in tyres of vehicles, etc.)?

b. What are the current energy sources being used to provide that service (e.g., kerosene, electricity, and solar for lighting, firewood and LPG for cooking, electricity for grinding grain, etc.)?

c. Which of these energy sources are non-renewable and/or polluting and what are the renewable and/or non-polluting alternatives that may be available?
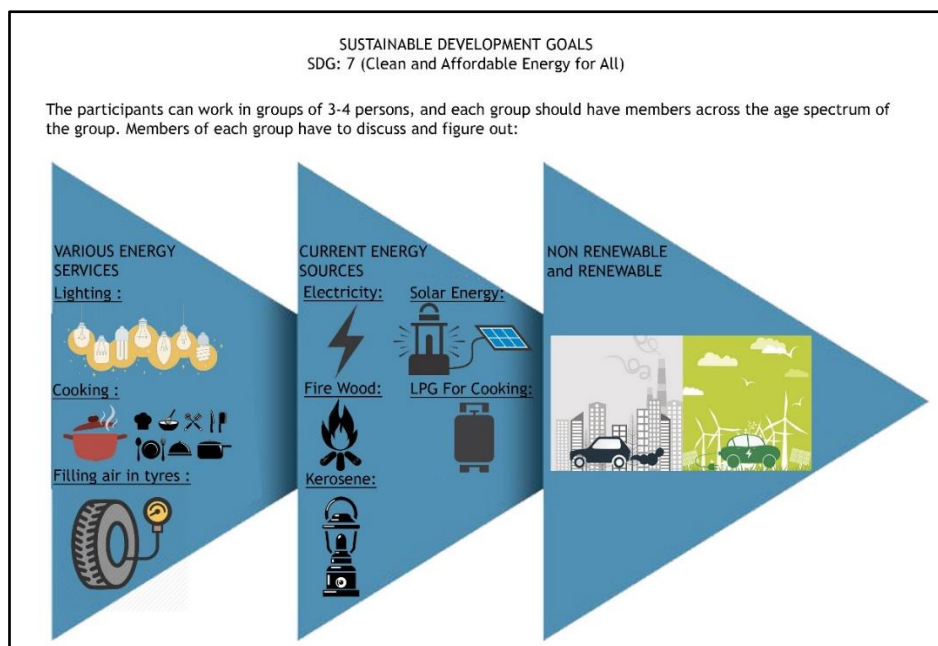
Understanding Energy Services

Discussion:

The first part of the discussion can focus on collating the information listed by all the groups to get a comprehensive picture of what energy services are being used by the community, what sources are providing those services, and how the same services can be availed in a clean and environment friendly manner.

The second part of the discussion may focus on cost analysis of the services, if the participants have access to the economic data. It may also be a good idea to invite a local renewable energy service provider (e.g., biogas installer, solar lamp dealer, etc.) as an observer for the activity, and invite him/her to share about their products/services and the benefits and economics of the same.

Additional activity:

To show a video on making a solar cooker and then make the cooker and cook something in it. Each group can make its own solar cooker. The following link is one of the simplest designs, but there are other videos available on YouTube. This particular solar cooker requires a cardboard box, pieces of thermocol (alternatively waste plastic bags filled with glass wool or rock wool or pieces of ceramic wool sheets may also be used), aluminium foil, a piece of glass, sticking tape, glue, etc.

https://www.youtube.com/watch?v=v5CdNH3sQT0

# 4. Building Climate Resilience - SDG 13 (Climate Action)

(Note: This activity is a variation on the so-called privilege game, where people whose roles represent certain privileges step forward and those whose roles represent weaker sections of the society are left behind. However, that can be traumatic to participants, especially if they belong to the deprived classes, and may bring on a sense of hopelessness. We are using the same format instead to highlight how every person has some strengths and some weaknesses which will be relevant in a crisis situation.)

Objective: To understand what climate vulnerabilities exist for the community, and what skillsets as well as resources are needed to build resilience.

Scenario: The group may discuss and agree on a specific climate change disaster hitting their area. For example, excessive rainfall leading to flooding of low-lying areas and landslides, fallen trees blocking roads, etc. The planning for the game will be based on this. The planning may require some brainstorming among the facilitators. Eventually, if the game is played with sufficiently large number of groups, the facilitators may develop a data bank of scenarios to use in any game.

Age group: 15 yr+

Materials: Role cards for all the people playing the game, List of questions to be asked by the facilitator, based on various alternative paths for a disaster scenario.
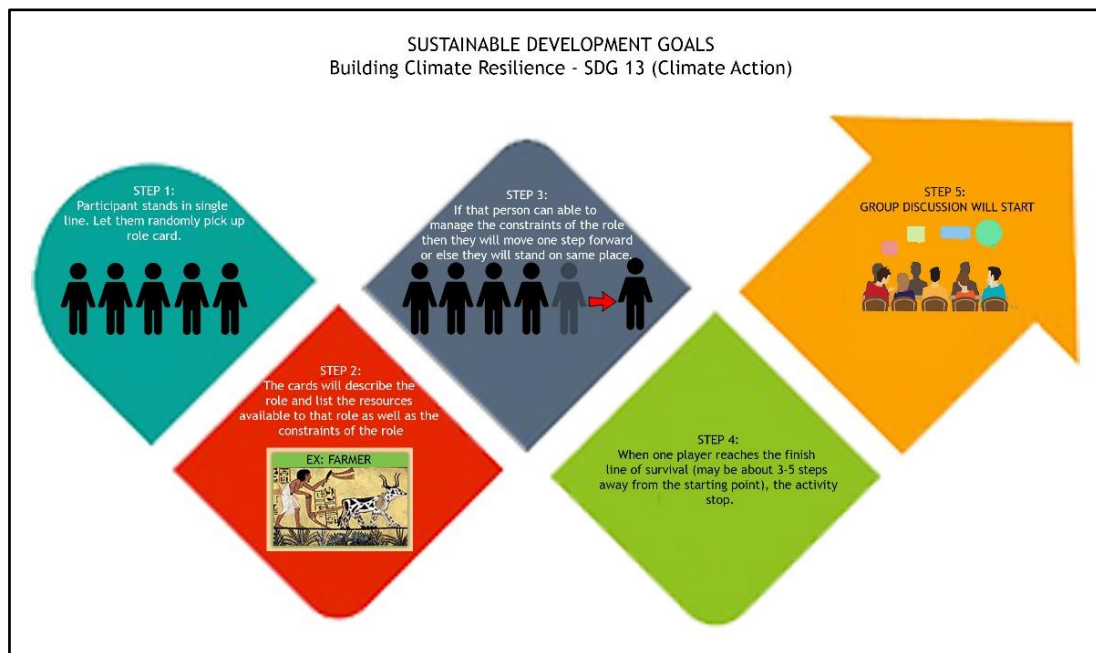
Climate Action Role Play

Description:

Let all the participants stand in a single line. Let them randomly pick up role cards. The cards will describe the role and list the resources available to that role as well as the constraints of the role (e.g., School Teacher - Female, can read and write, has access to radio, TV, and cellphone, is responsible for 50 children stuck in the school. Itinerant farm labourer - Male, illiterate, has no access to radio, TV, cellphone, can swim and knows how to build a makeshift shelter on land).

Role: Farmer	
1	Male
2	Farm Laborer
3	No access to radio, TV, cellphone
4	Can swim
5	Can build a movable house

Role: Teacher	
1	Female
2	Can read and write
3	Has a mobile with internet
4	Is responsible for a class of 50 students
5	Doesn't know to swim

Sample Role Cards

The facilitator reads out the starting of a specific situation (e.g., flooding of the school ground or road block due to fallen trees, etc.), and the persons whose roles provide them with the wherewithal to overcome the situation (e.g., use cellphone to send out a call for help, or use the branches of a fallen tree to build a shelter, etc.), will step forward one step. Those who cannot overcome the situation, will stay in their original position. For the second step, the facilitator will randomly pick up a card with an alternative next situation. The sequence of situations should be realistic. For example, in the case of the flooded school, the cellphone may be working and message may be sent out to the local police in the first step. However, in the next step in the scenario the police may be overwhelmed with pleas for help, and may not be able to respond to the distress signal from the school. This will give a set back to the teacher. An alternative scenario could be that the police are on the way to the school but are blocked due to the fallen trees. However, this means that the itinerant labourer who was also

stuck by the fallen tree now has a chance of being rescued. This will be a setback for the teacher, but an advantage for the labourer.

When one player reaches the finish line of survival (may be about 3-5 steps away from the starting point), the activity stops, and the state of each player (survived, good chances of survival, in crisis, doomed to die, etc.) is recorded.

Discussion:

The discussion may focus on what vulnerability means to individuals and to the community as a whole. A list of skills and resources required for dealing with the most probable climate disasters in the location may be put together. The group may discuss a possible action plan to reduce the vulnerability of the community, by addressing the skill / resource gaps of various members of the community. The group may also come up with a Climate Disaster Risk Management Plan for the community.

The discussion may also focus on the importance of both survival skills and access to technology, knowledge, money, etc. This activity should be used for highlighting the strengths and weaknesses of all sections of society in the face of a climate disaster. This in turn will also highlight the importance of collaboration and co-operation for the survival of the community as a whole.

5. Sharing a River Basin - SDG 12 (Responsible Consumption & Production) and SDG 6 (Clean Water & Sanitation)

(Note: This game is a variation on the computer-based 'River Basin Game' by Twente Water Centre, Twente University, The Netherlands. The basic idea is similar to the generic 'Drain or Sustain' game, but with a bit more elaborate role play and simulation of a real-life situation.)

Objective: The main objective of the game is understanding the challenges of managing aspiration in the face of a limited resource. But the game also brings out lessons on how the individual aspiration and community wellbeing are in conflict with each other.

Materials: Rupee notes made for games, Blue coloured pieces of cardboard or stiff paper representing 1 unit of water each, Chits written as 'upstream', 'midstream', 'downstream' and chits with numbers, opaque bags for holding the water cards for each of the three groups, 'I owe you' notes.

Age Group: 16 yr +

Description:

The game can be played by minimum 3 and maximum 15-20 persons. Decide the number of farmers 'upstream', 'middle stream' and 'downstream' depending on the number of players. You may go for equal numbers in all three zones of the river basin, or you may have more farmers downstream, less midstream and even lesser upstream. Accordingly make number of chits with words 'upstream', 'midstream', 'downstream'.

In the first step, the players first pick up from the 'region' chits to decide who will role play farmers in which region. Then they pick up from the 'number' chits to decide who will have the right to the water in which order, for each region. The 'farmer' who draws number 1, will have the first right, the one who draws number 2, will have the second right, etc. Thus, at the end of this step everyone knows the area of the river basin that they are situated in and the order in which they will draw water from their area.

Each area of the river basin will be allotted blue cards representing water units. The upstream starts off with 50 water units, midstream with 75 and downstream with 100. The numbers will be told to the 'farmers' at the start of the game, but not in subsequent rounds. These water units will be inside a cloth bag so that the 'farmers' cannot see how many cards are there in the bag. Three bags assigned to the three regions will be near the facilitator of the game.

At the start of round 1, which represents Year 1, the farmers in each group will go to the facilitator in the order assigned (first right farmer goes first, second right goes second, etc.), and draw cards from their bag. Each farmer will take as many cards as he/she feels like taking. The number of cards drawn is noted by the facilitator, and the facilitator gives the farmer Rs.10 x number of water units drawn. Thus, the farmer has used a certain amount of water, and gained a certain income from the same. However, there is also a price for the water units, which is least for the first right farmer, but increases as we move down the hierarchy of rights. Thus, the cost of the water unit is Rs.1 for the farmer with first right, Rs.2 for the farmer with second right, and so on. This price of the water units will be subtracted from the money given to the farmer. In the first round, the farmers are not allowed to go in debt, however if no water cards are left for the last farmers in the hierarchical order, they will 'die' from the game. If in a region some farmers die in the very first round, the profit per water unit for that region is reduced by Rs.2 per dead farmer. This rule will ensure fair play in the first round.

Thus, for example there are 3 farmers in upstream region for which 50 water units are assigned. The first farmer picks up 10 water units. Then his/her income is Rs.10 x 10 = Rs.100, but he has to pay a price of Rs.1 x 10 = Rs.10. Thus, the facilitator has to give him/her Rs.90. The second farmer picks up 5 water units. Then his/her income is Rs.10 x 5 = Rs.50, but the price is Rs.2x5 = Rs.10. Thus, his/her net profit earned from the facilitator is Rs.40. The third farmer picks up 10 water units. Then his/her income is Rs.100, but price to pay for the water

is Rs.30, earning him/her a net profit of Rs.70. The farmers have thus used up 25 water units, leaving 25 units in the bag.

Before round 2, which represents Year 2, the water in the river will be replenished by rain and by inflow. The rain is typically high in upstream regions, and relatively low in mid and downstream regions. However, the mid and downstream regions get some inflow from upstream. Taking this into account, the addition of cards to each bag by the facilitator should be Rain + Inflow - Outflow. Let's assume that the rain adds 40 water units upstream, and 20 each mid and downstream. Let's also assume that there is an outflow of (Reserve + Rain)/1.25 from each compartment, and outflow of previous compartment is inflow of each compartment. The facilitator needs to count the cards remaining in each bag, and do these calculations to decide what should be the starting number of cards in each bag. So the calculation will be:

Upstream: (Reserve of upstream after previous round + 40) - (Reserve of upstream after previous round + 40)/1.25

Midstream: (Reserve of midstream after previous round + 20) - (Reserve of midstream after previous round + 20)/1.25 + (Reserve of upstream after previous round + 40)/1.25

Downstream: (Reserve of downstream after previous round + 20) - (Reserve of downstream after previous round + 20)/1.25 + (Reserve of midstream after previous round + 20)/1.25

If the facilitator has a laptop, this can be programmed in an excel file for quick calculation. The calculated number should be rounded off to the nearest integer, and the corresponding number of 'water units' must be added to each bag.

In the second round the price of the water will remain the same if the number of cards in a bag is same as or more than the first round. However, if the number of cards has decreased, the cost of water will double for that group of farmers. Thus, farmer with first right will now pay Rs.2, farmer with second right will pay Rs.4, and so on. Each farmer must use some water, and therefore this may drive a farmer into debt, as the income per water unit remains the same (or reduces if some farmers have died in the first round). The amount of debt will be noted by the facilitator and the farmer in the form of an 'I owe you' note. If a farmer towards the tail end of the hierarchy is left with no water units, he/she will 'die' and go out of the game.

The third round will follow the same process as the second round, and so on. The game may be played for minimum 3 rounds, representing 3 years of use of water in the river basin. It can be played for 5 or more rounds, to get a full picture of the water crisis that may erupt in the river basin.
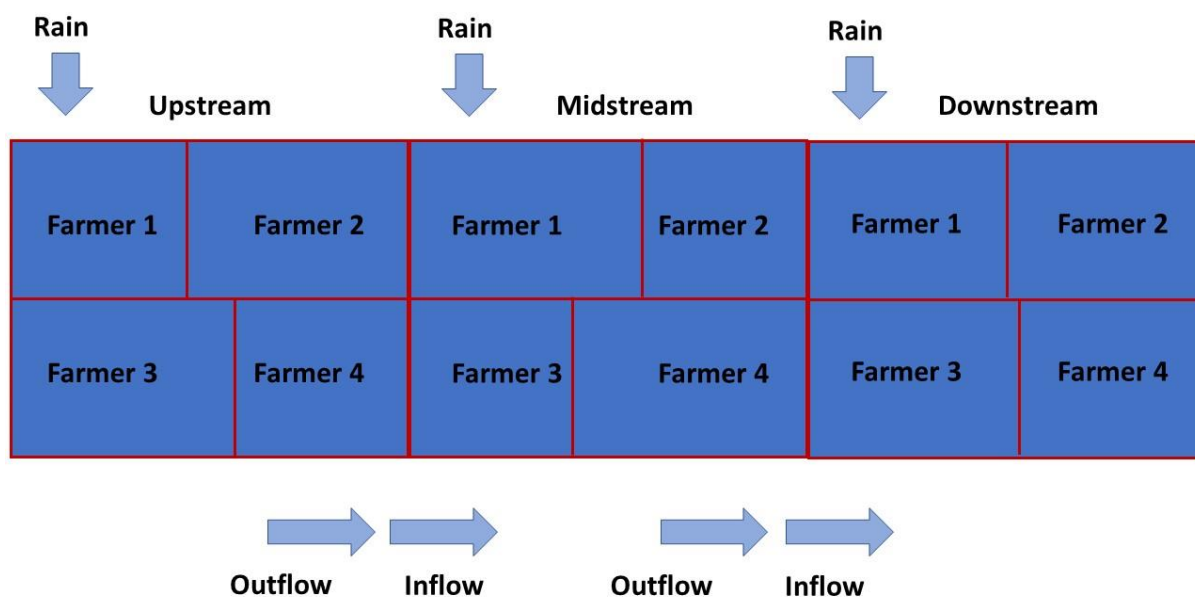
Schematic Game Plan

Discussion:

Each farmer in each group will talk about his/her challenges in balancing the need to gain profit each year, and still try to conserve the water for next year. This can trigger off discussion of what should have been the ideal play for each player for sustainable consumption and production. The role of social hierarchy (up, mid or down stream) as well as locational bias (first, second, third… etc., right) in access to resources is also highlighted in the different ways each farmer is impacted. Depending on the number of players and the number of rounds played, it might be seen how some farmers would be always doomed to debt in spite of however they strategized.

The real life additional factors such as difference in fertility of land, natural fluctuations in rain patterns, flow of not just water but pollutants from upstream to downstream, etc., may also be brought into the discussion to highlight the complexity involved in achieving sustainability.

The game may also create an opportunity to discuss water conservation practices in agriculture, solutions to the problem of river water pollution, various other pressures on rivers (e.g., supplying water to nearby cities and industries, hydropower generation, etc.) thereby bringing in aspects of SDG 6 (Clean Water and Sanitation), and in general waste management.

A variation may be added to the activity to highlight the impact of climate change, especially if more than 3 rounds are to be played. The facilitator may toss a coin to decide whether to allot 'rain' to a part of the river or not while computing the water replenishment for each part of the river basin at the start of each round.

In an urban setting, the game can still be played with some variations. The river may be replaced by a water reservoir which starts with 50 water units, and is replenished by 40 water units every year. The 'upstream', 'midstream', 'downstream' farmers will be replaced by clusters of houses and small businesses living at different distances from the water tank, so that they pay different price slabs for the water ('upstream' pay lowest prices, 'midstream' middling prices, and 'downstream' highest prices). They are all drawing from the same bag, and earning the same income from each water unit, but they are paying different prices for the water units, based on their location from the water tank and based on their hierarchical position at that location.

Another variation in the urban game could be to have pairs of 'house' and 'business' as teams in each group. The houses must pick up water cards and pay for the water but will not gain any money from these. The house will use the earnings of the paired business to meet its water needs.

The urban game may also add an aspect of subtraction of some water from the reservoir every year due to contamination by pollution, if sanitation and waste management issues are to be highlighted in the discussions. In each round the participants may have the option of donating some of their earnings towards building a good sanitation system. The cost of the sanitation system will be predetermined, and if and when that amount is reached in the donation box, in subsequent rounds there will be no subtraction of water from the annual replenishment.

Essentially, the game can reflect as much of the real situation around water use as possible depending on how much complexity in the game is acceptable to the participants.

Samuchit Enviro Tech, based in Pune.

Samuchit is a social enterprise with the mission of enabling individuals, households, institutions, and small businesses to embrace sustainability in their daily activities. While the majority of activities are focused in western India, Samuchit has been involved with a number of pan-India projects as well as projects in other countries in Asia and Africa, either as service/product provider for eco-friendly lifestyle products or as adviser for projects on environmentally sustainable household energy.

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Laya, an NGO based in Visakhapatnam.

Laya's journey for over 25 years aims at empowering the adivasi communities through a range of initiatives that demonstrates an alternate paradigm to development which is inclusive, equitable and sustainable. Laya functions as the secretariat of INECC.

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The Indian Network on Ethics and Climate Change (INECC).

INECC is a national network comprising of individuals and organizations from across 5 ecosystems and 12 states, who are concerned with the issue of climate change from a micro-macro perspective. It connects the issue of Climate change to larger sustainable development and social justice concerns. INECC's bye line is "Peoples Voices in Policy Choices'. In this context INECC perceives policy choices in favour of communities most challenged by the Climate Crisis.

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