TRINITY

Phycoremediation Technology

"Cleans polluted water bodies as nature does"

Ponds, Lakes, Drains, Rivers

STP and ETP – Rejuvenate city wide water works

We clean water and air, naturally!

Presentation by

Trinity International – New Delhi

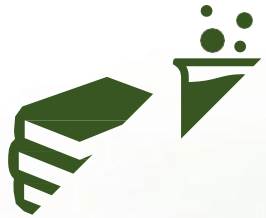
About us – Trinity International

We are a team of scientists with decades of experience

We have global footprint with clients in India, UK, Colombia, Iran etc.

We clean water and air, Naturally!

RIVERS, LAKES, PONDS
STP, ETP, CETP



Over 30 years of research into Algae technology and multiple research papers.
In collaboration with our scientific partner PERC - Chennai

Strategic partners in various regions offering end to end solution

No Chemicals & No Electricity

Headquartered in New Delhi

Research Labs in New Delhi and Chennai

(Recognised by NGT and approved by State PCB)

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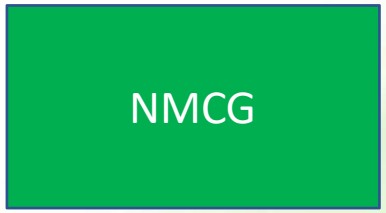
Some of our clients and many more…



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About Technology

Phycoremediation

FACTS

➢ **Phycoremediation is defined as the use of either macro-algae or micro-algae** for the removal or biotransformation of pollutants, including nutrients and xenobiotic from waste water

➢ **Nature** has been using Algae for cleaning of water and sustaining bio-life for millions of years by creating natural food chain. **Almost the entire oxygen in water be it in sea, oceans or rivers is only because of Algae**.

➢ **Photosynthesis** (Chlorophyll in Algae using Sun light and Carbon Di-oxide) is the main action (Bio-Oxygenation) performed by Algae in water to increase DO level which takes care BOD and COD demands up to 99 % and also reduces of EC, TC and TSS up to CPCB standards without addition of any chemicals and electricity

➢ **Apart from Bio Oxygenation, pollutants Like Nitrates, Phosphates, Sulphates, Carbonates etc. including heavy metals like Cr, Arsenic , Mercury , Fluoride etc. are absorbed by Algae**. These pollutants are necessary for contributing to growth of customized Algae (for cell formation & energy required by the algal cell) Absorption of pollutants by Algae leads to cleaning of Effluents. It may be mentioned here that where TDS is high , the reduction does not take place beyond 30-40 % but all remaining TDS is bio transformed to Bio Fertilizers , a Source of Revenue .

➢ Since Carbon-di-oxide is used during process of photosynthesis, **this is highly Carbon Negative technology. Approx**. 70 % of oxygen in this world is produced by Algae and rest by trees.

➢ But without Algae the entire bio life in natural water bodies will cease to exist. **An aerobic bacterium which helps cleaning water has symbiotic relationship with Algae that we use. All the Algae Consortia that we use are Non Toxic**

Our Technology - PHYCOREMEDIATION

"Nature has been using Algae for cleaning of water and sustaining bio-life for millions of years by creating natural food chain. Almost the entire oxygen in water be it in sea, oceans or rivers is only because of Algae"

Our technology generates a circular economy

There is a hugely positive ecological impact

Access to clean water

facilitates employment opportunities

Fish farming can be introduced

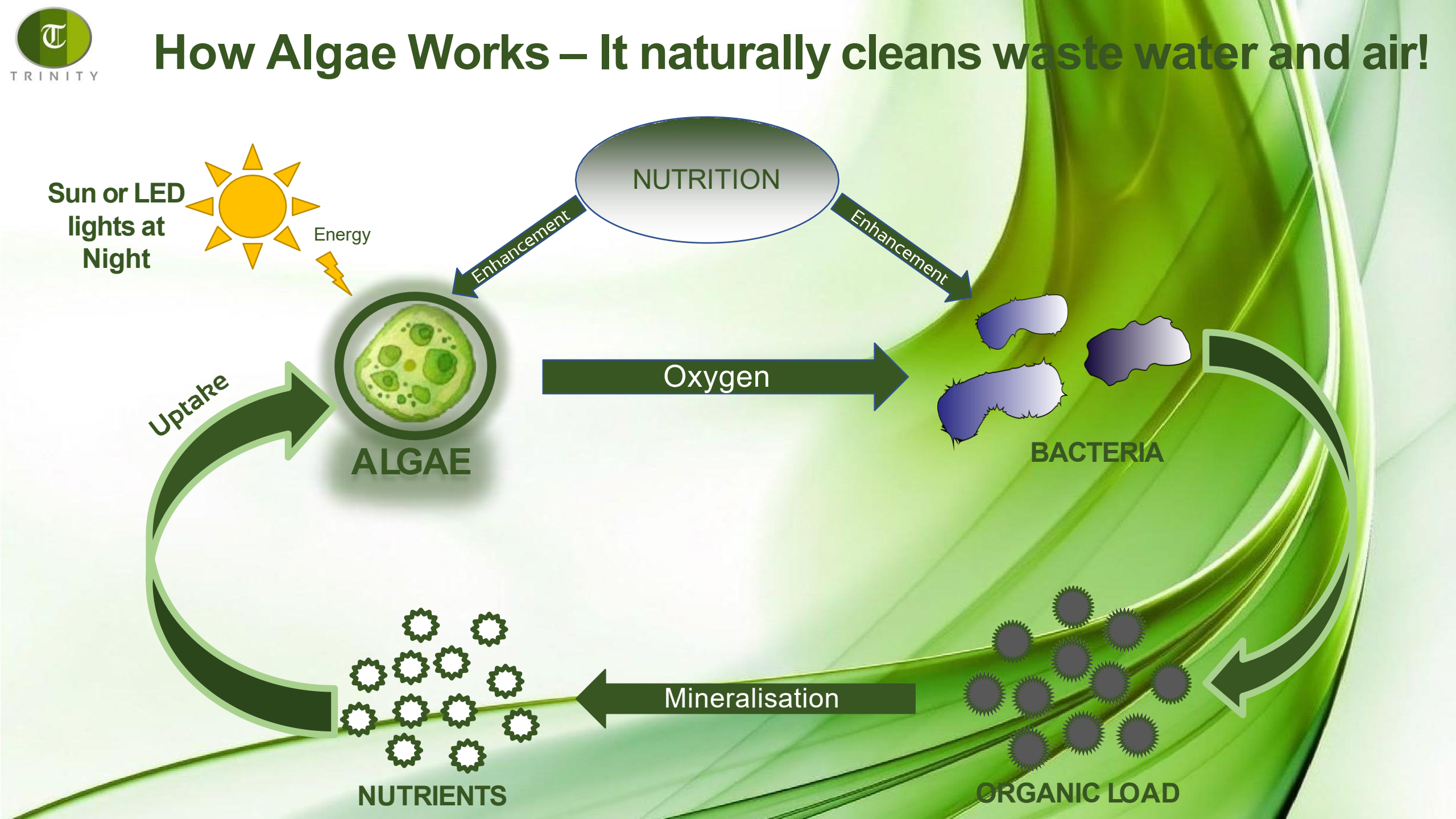
Fertile water for irrigation

And many more…

NO CHEMCIALS | NO MACHINERY | ECO-FRIENDLY SETUP | NO ELECTRICITY

CARBON NEGATIVE

How Algae Works – It naturally cleans waste water and air!



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Algae sustains bio life in the sea using Sunlight + CO_2

It generates 100 % pure Bio Oxygen and pH correction to Neutral – Basic (8.5 max)

ALGAE is responsible for generating OXYGEN in water bodies to sustain bio-life!

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This is how we first grow algae consortia in bottle

Green Micro-Algae Acts like Micro Plant

IMPORTANT!

50,000 liters of **algae** is more than ***27500 trillion micro plants***

OR

1fully grown tree

Trees will take years to grow while **algae** grows in hours/days

Comparison - Trees/Plants Versus Micro-Algae

PLANTS	ALGAE
Takes years to grow	Takes Hours/days to grow
Does transpiration	Algae does transpiration
Needs Nitrates /Phosphates other nutrition to grow	Also needs Nitrates/Phosphates /other nutrition to grow
Produces roots, Leaves, stem etc. while growing	Does not produce leaves/roots etc.
Multiplication of cell is very very slow	Multiplication of cell takes place at very fast rate
Cannot tolerate harsh conditions	Can tolerate very harsh conditions

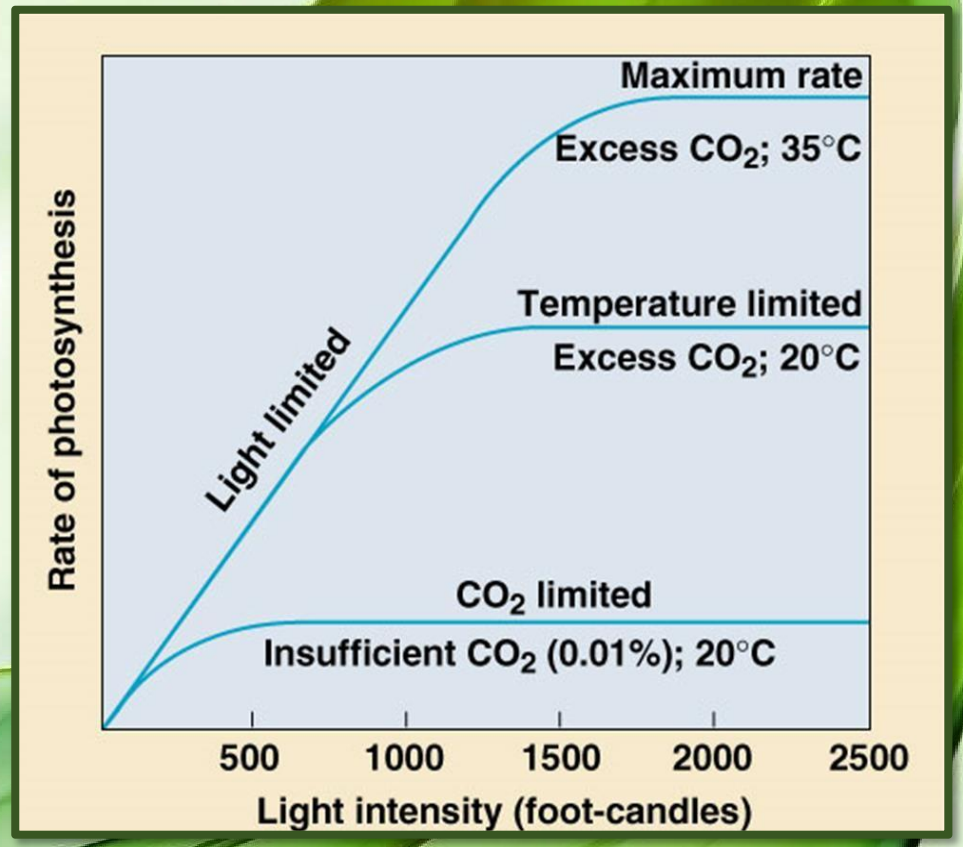
Algae carries out photosynthesis for Bio Oxygenation Light dependent & Independent

Sun Light dependent

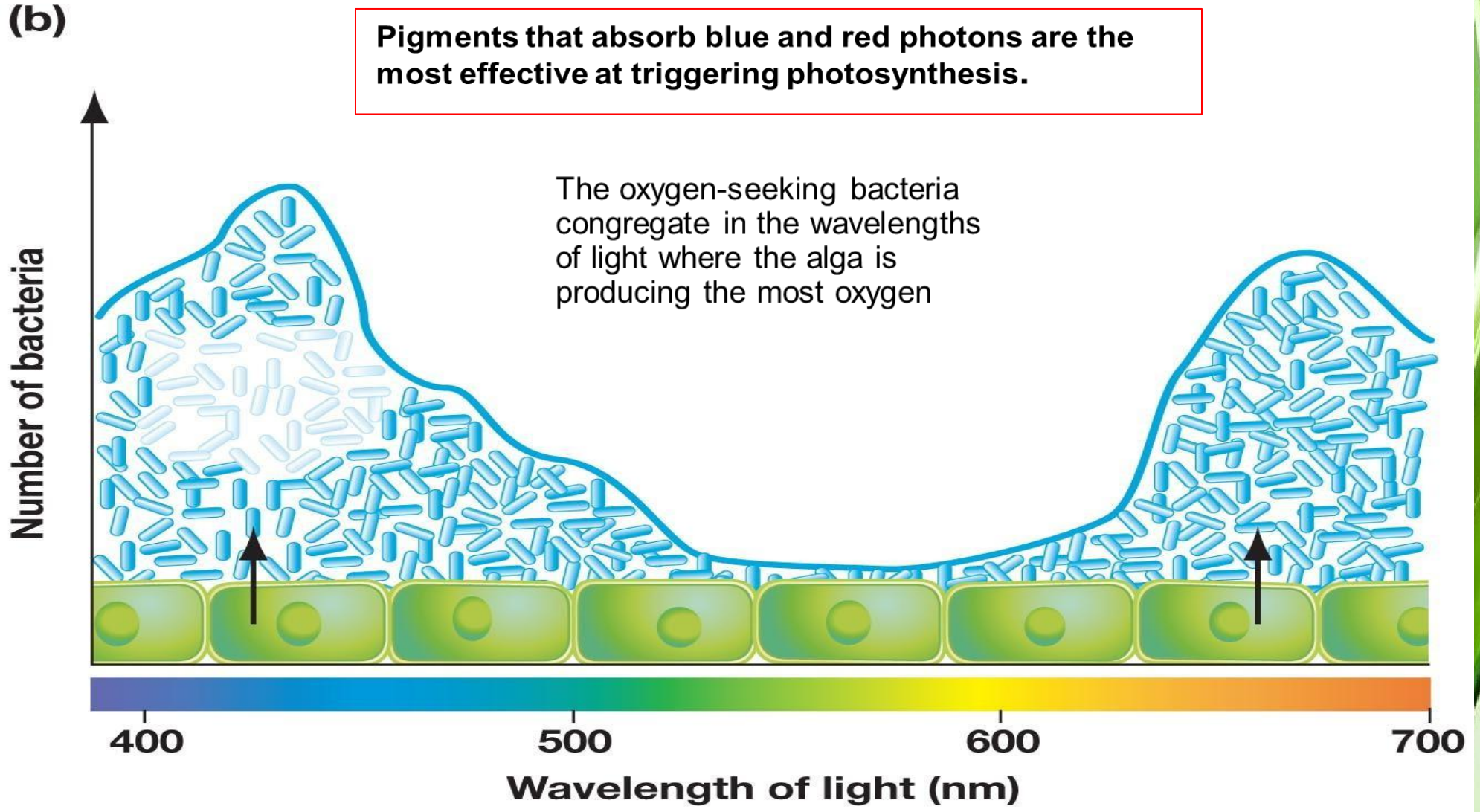
Carbon dioxide (CO_2) requiring process that uses light energy (photons) and water (H_2O) to produce organic macromolecules (glucose) and Oxygen.

$$6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$$

Sun Light independent - may require LED



Symbiotic relationship of aerobic & other natural bacteria makes bio-oxygenation more effective for waste water treatment

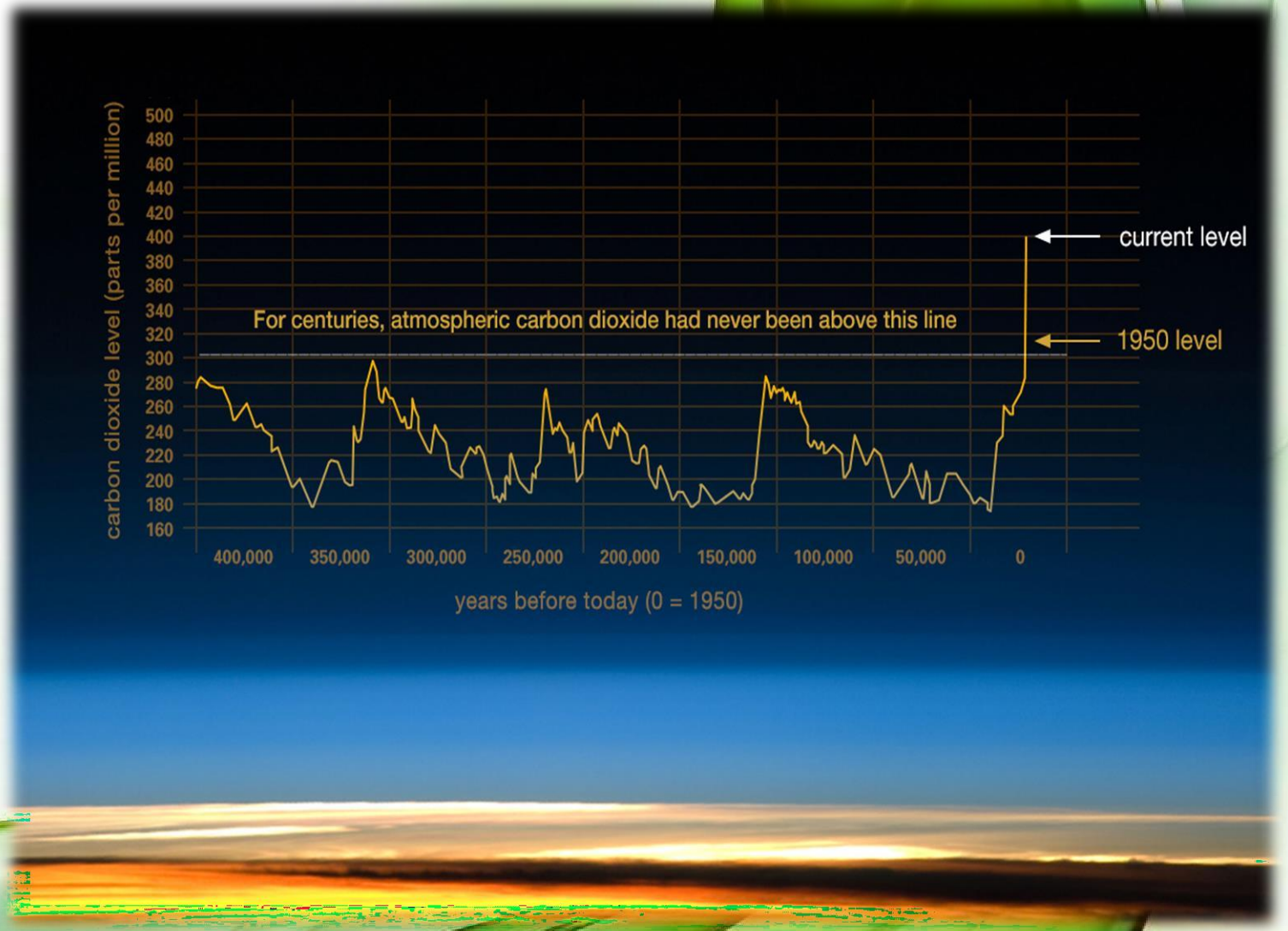


Current impact of climate change – ALARMING!

Since 1950 – There has been an almost vertical hike in the amount of carbon dioxide being released in the atmosphere due to unsustainable methods in industrialization, globally.

Freak weather, intense heat or cold waves, intense rain, flooding or famine in recent times are all due to changes in our climate.

ALGAE is at the forefront to reverse the damages and will play the largest role in achieving this. The world has started using Algae in many areas to reverse the impact!



Absorption of Carbon-Di-Oxide by Algae

It is common knowledge that Algae is responsible for over 60% - 70% of Oxygen generation on planet earth since billions of years.

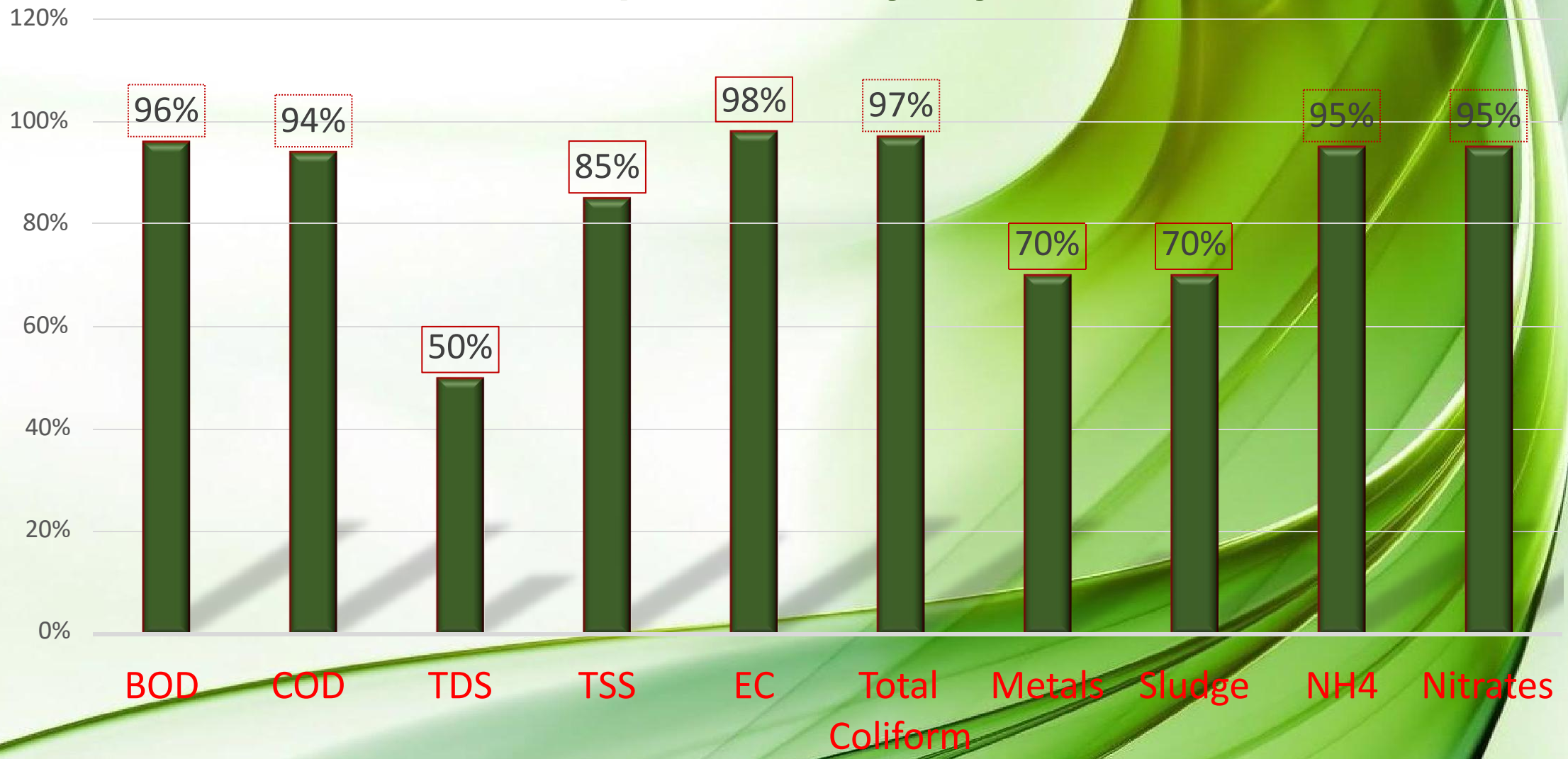
On the other hand, trees and plants contribute around 15%

FACT:
1 gram of Algae biomass can consume up to 1.86 gram of Carbon dioxide

Algae for Waste water Treatment – BEST IN CLASS!

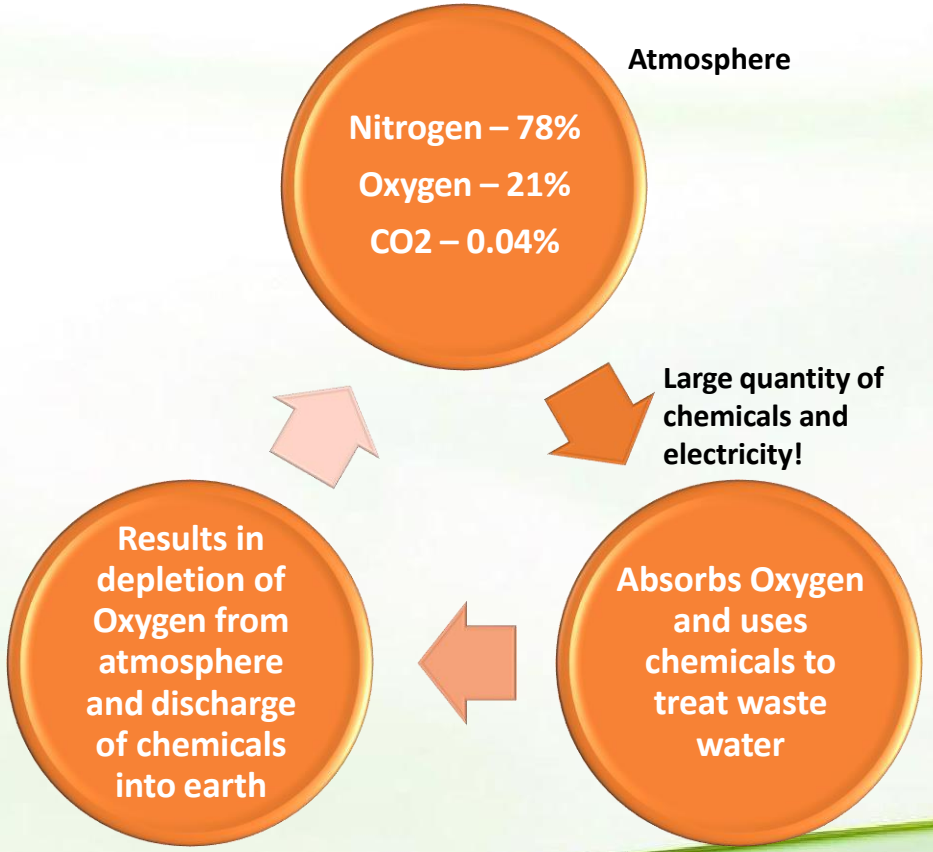
No Chemicals | No Electricity | Carbon Negative

Reduction of parameters by Phycoremediation



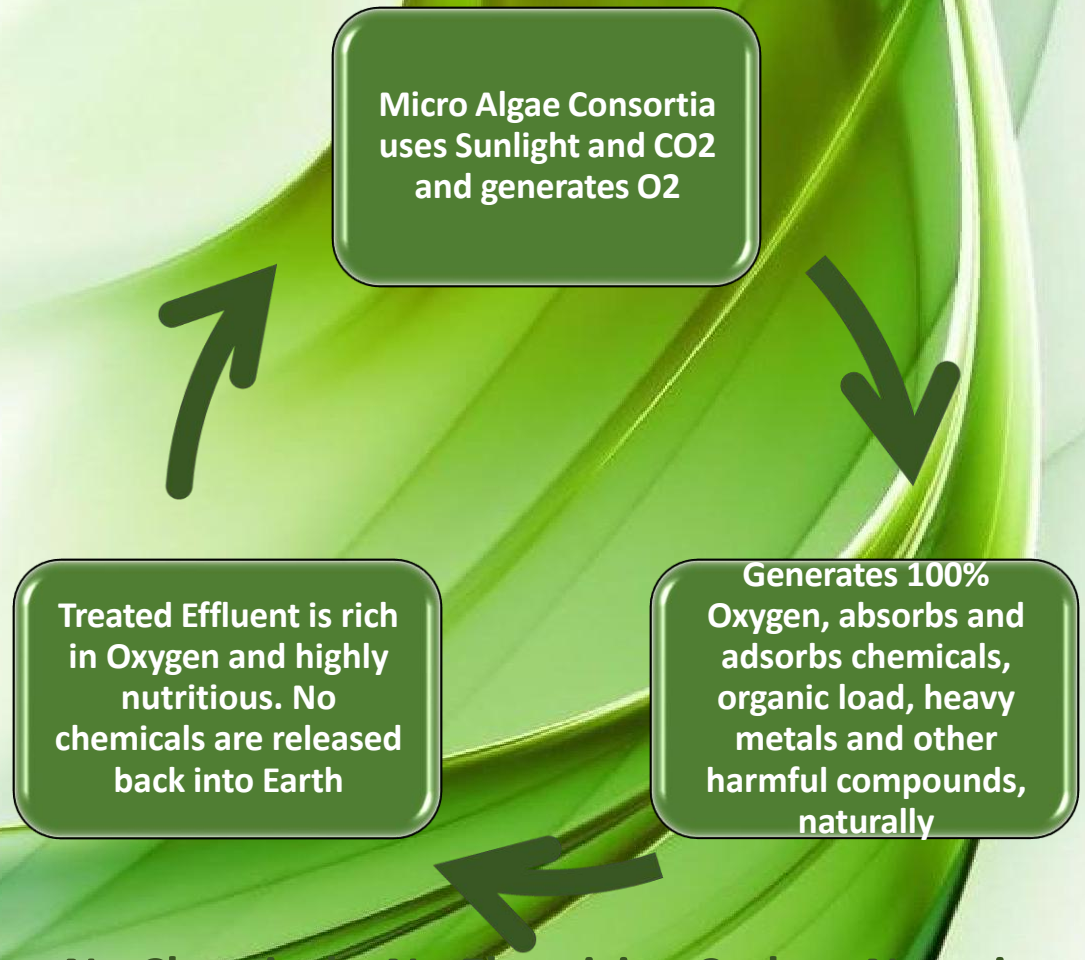
Comparison – Conventional Versus Phycoremediation

Conventional System (for e.g. - STP)



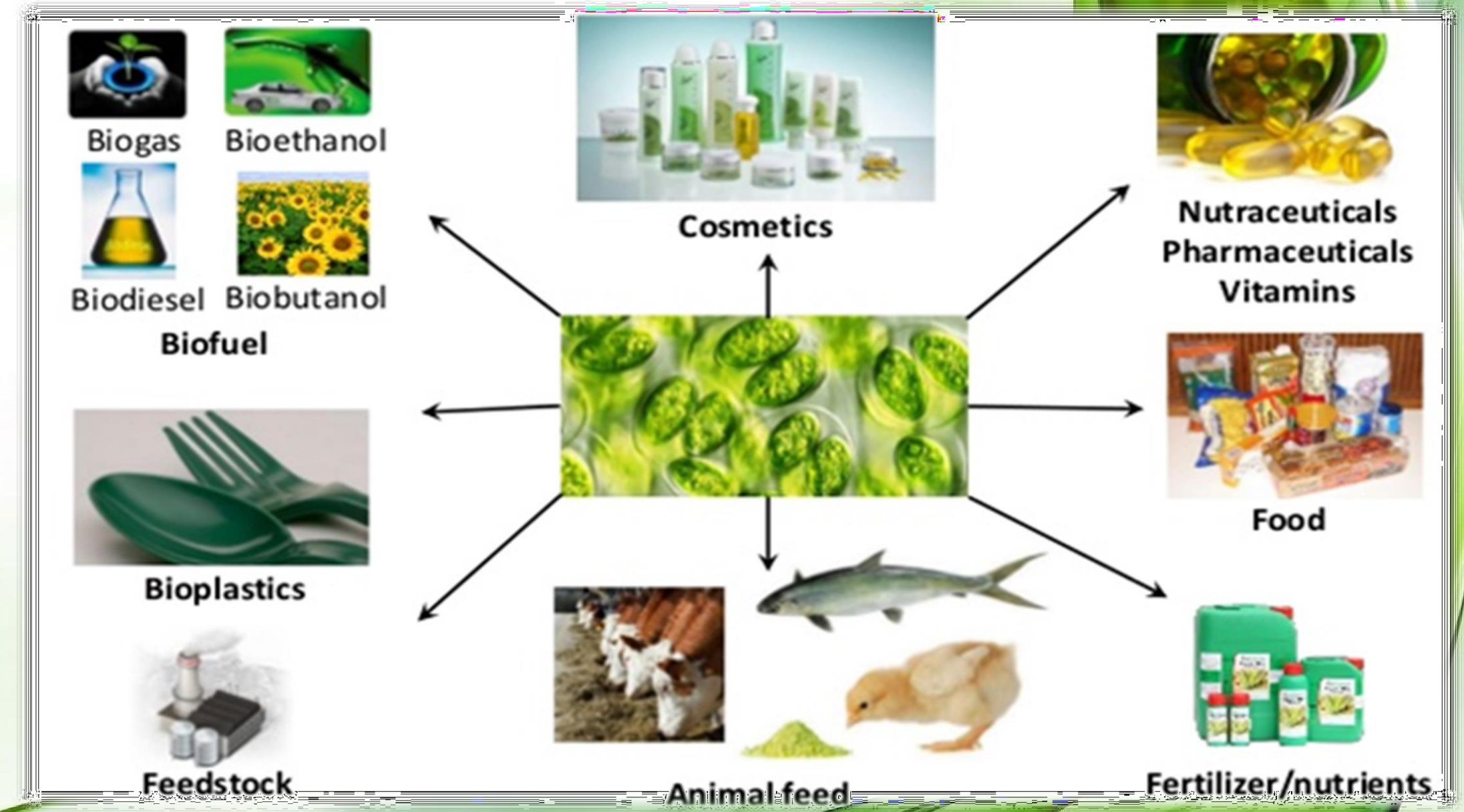
Expensive, Inefficient and huge maintenance cost

PHYCOREMEDIATION



No Chemicals, No Electricity, Carbon Negative

Nothing goes to waste – Revenue Model!



Limitations of Phycoremediation

- Temperature reaching freezing point (Below 4 degrees)
- No Sun Light or scope to put up LED Lights
- When effluent is very dark & thick and Sunlight or LED light cannot enter the effluent, like effluent in molasses based Distillery. In such cases, the effluent needs to be diluted and various technologies could be used including use of Algae
- There is no horizontal or vertical space at site for Algae production
- Chlorides are hard for Algae to absorb or adsorb, however research is on

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Thank you

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