

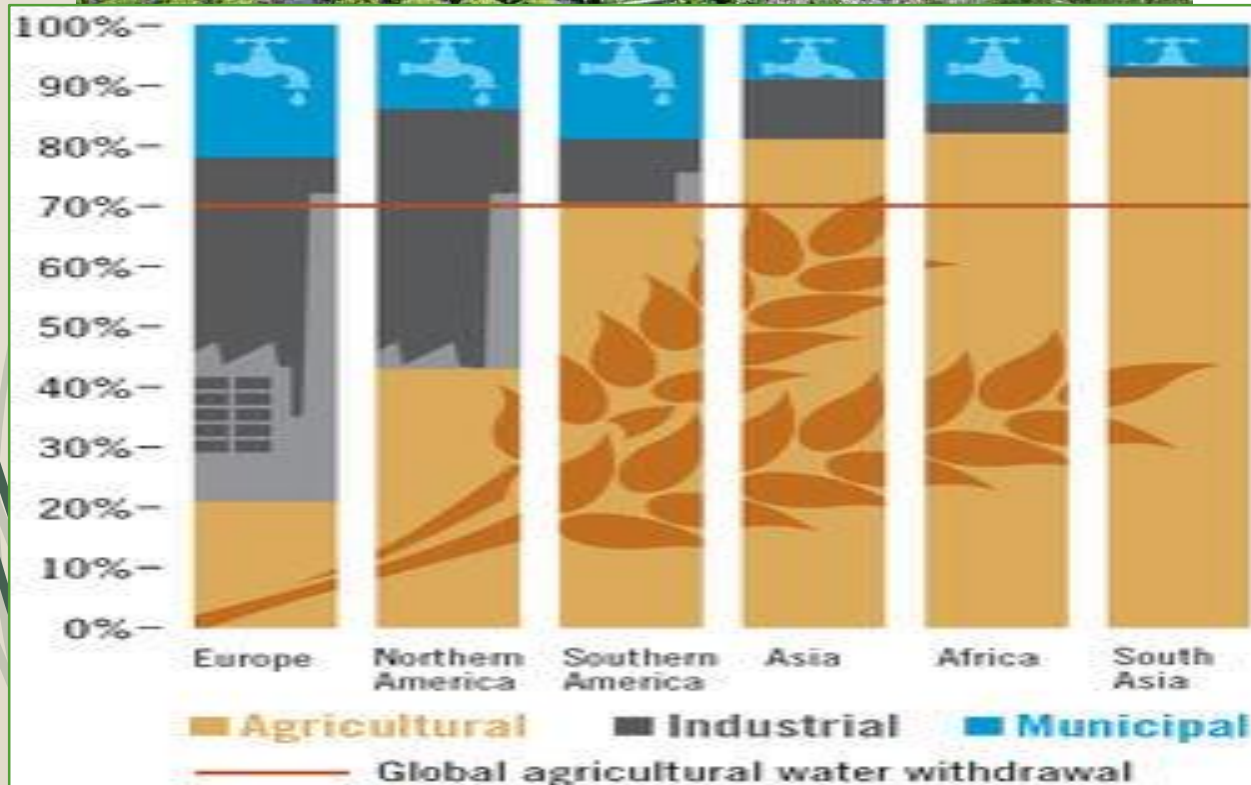


“sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (UN Bruntland commission).

“sustainability is the ability to continue a defined behavior indefinitely” (thwink.org, 2014).

“Sustainable food production is the ability to keep producing food in a way that not only conserves, but renews our natural resources, while it improves nutrition and health outcome for the world’s increasing population” (McCann, 2017).

Sustainable agriculture and water



Depletion:

- In Punjab: groundwater is being pumped at a rate 30% higher than is being recharged (Pearce, 2006)
- In California, groundwater is being pumped at an average of 15% more than the rains can replenish (Pearce, 2006)

Usage:

- Agriculture is responsible for some 69% of the world's fresh water withdrawals (FAO, 2016)
- 1 kilogram of beef = some 15,414 liters of water

Degradation:

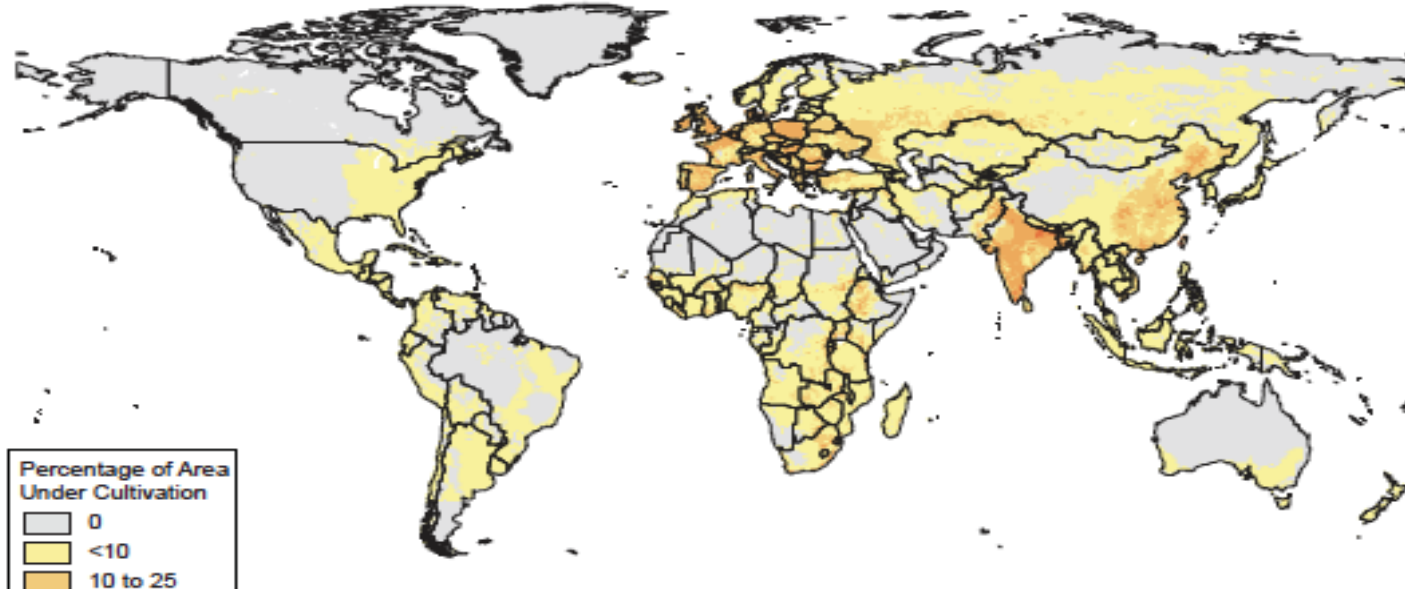
- In the U.S., agriculture is cited as a leading cause of groundwater pollution (FAO, 2009)
- Nitrogen used in agriculture fertilizers have disturbed the natural biogeochemical nitrogen cycle of earth ecosystems, resulting in soil acidification, eutrophication, and nitrate pollution of ground and surface waters (Kanae, Hirabayashi, Yamashiki, & Takara, 2011)

Sustainable agriculture and Land

Almost half (some 40%) of global land surface is devoted to some form of agriculture (ourworldindata.org).

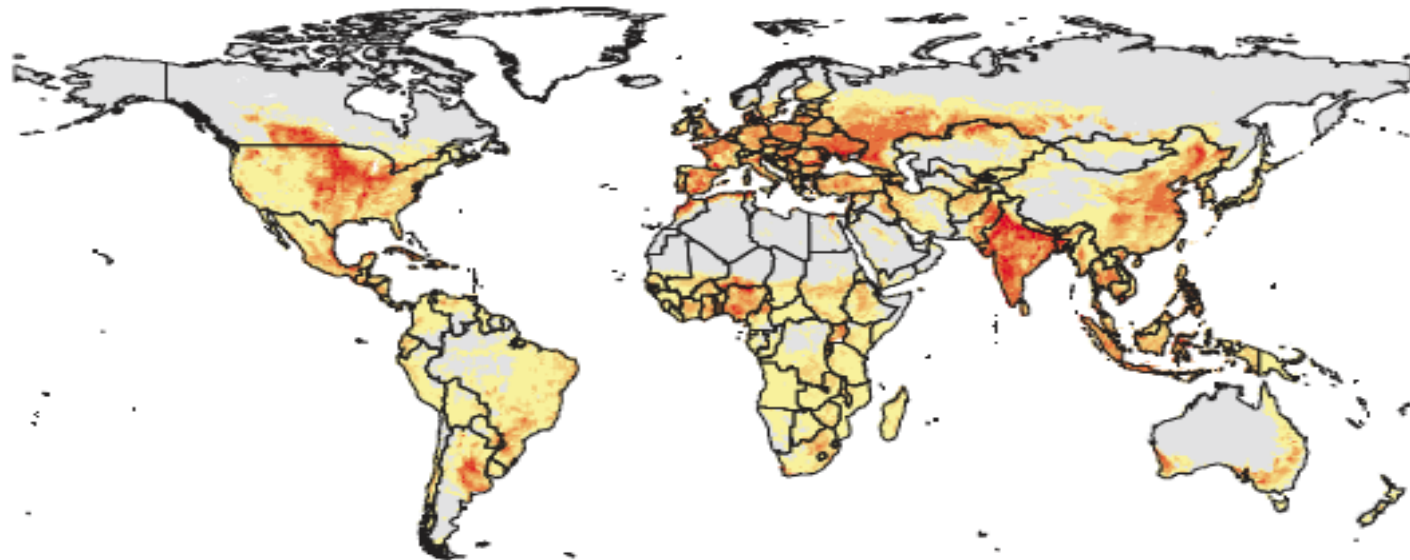
12% is in cropland, and out of that 12%, over half (8%) is dedicated to animal feed (ourworldindata.org).

Panel a: Cropland Extent, 1700



The changing global landscape of crop production, 1700-2000 – Alston, Babcock, & Pardey, 2010) based on SAGE data

Panel b: Cropland Extent, 2000



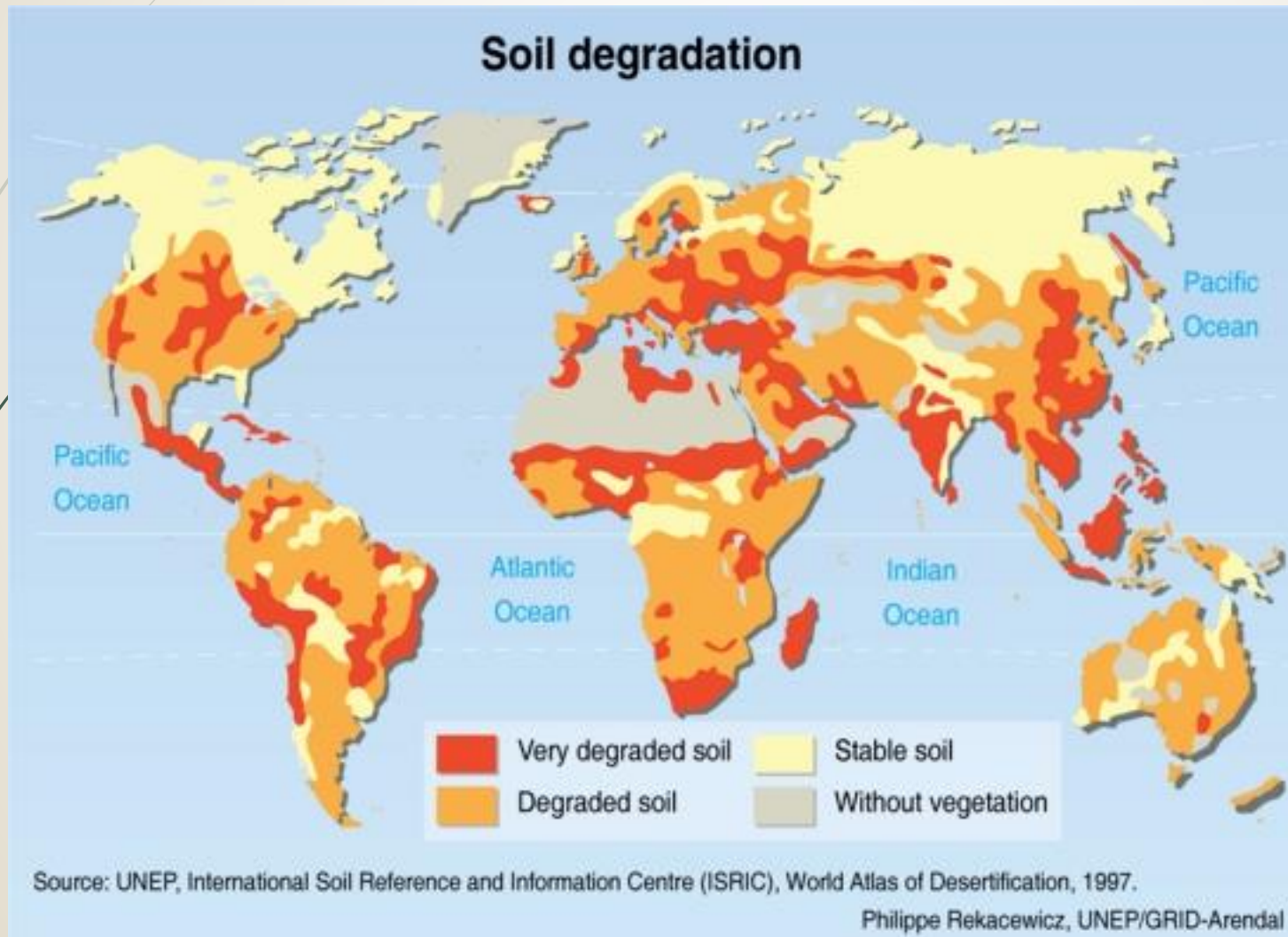
70% of previous forested land in the Amazon is occupied by pastures, and feedcrops cover a large part of the remainder (FAO, 2006).

And

Deforestation and overgrazing are the leading agricultural activities responsible for most types of soil degradation (WHO, 2017).

Direct drivers of biodiversity loss are: habitat change, climate change, invasive alien species, overexploitation, and pollution.

Today's commercialized, industrial agriculture and in particular, animal agriculture, contributes either directly or indirectly to all these drivers of biodiversity loss, from local to global levels (FAO, 2009).



EPA estimates from 2010 put “agriculture, forestry, and other land use” annual global emission outputs at 24%.

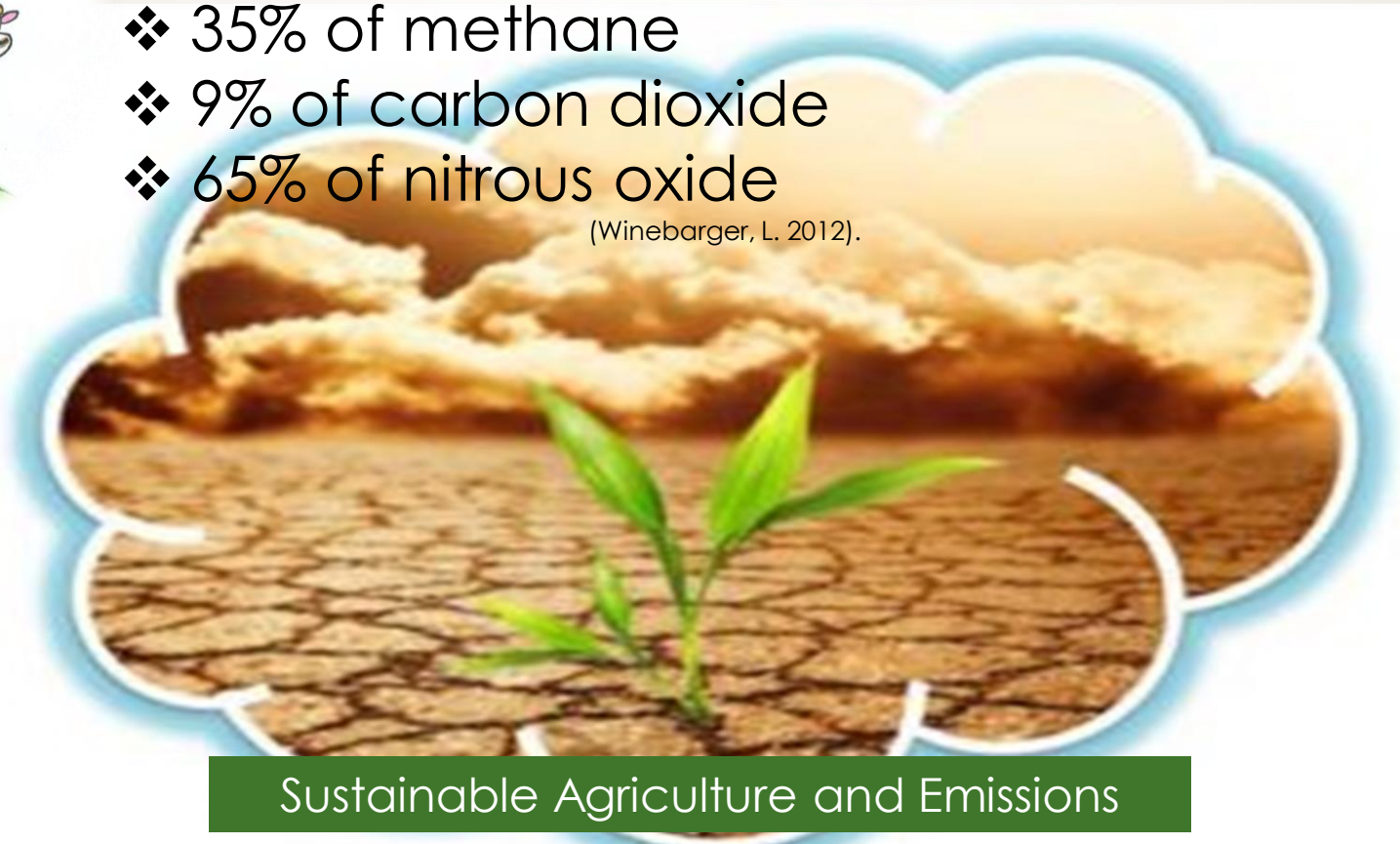
Annually and globally agriculture is responsible for the emissions of approx. 10 billion tons of greenhouse gases (FAO, 2014).



Animal agriculture accounts for approx. 18% of global & annual greenhouse gas emissions:

- ❖ 35% of methane
- ❖ 9% of carbon dioxide
- ❖ 65% of nitrous oxide

(Winebarger, L. 2012).



Sustainable Agriculture and Emissions

The New 2015-2020 Dietary Guidelines

Focus on **variety**, **nutrient density**, and **amount**. “To meet nutrient needs within calorie limits, choose a *variety* of *nutrient-dense* foods across and within all food groups in recommended *amounts*.”

So then, what about variety

only three food crops (rice, corn and wheat) provide nearly 2/3 of global dietary energy intake. (Jones & Ejeta, 2015)



"Ninety percent of the world's food is derived from just 15 plant and 8 animal species"

(Pimentel & Giampietro, 1994)



The New 2015-2020 Dietary Guidelines

Focus on **variety**, **nutrient density**, and **amount**. “To meet nutrient needs within calorie limits, choose a *variety* of *nutrient-dense* foods across and within all food groups in recommended *amounts*.”

So then, what about nutrient density

Underutilized plants/crops that are nutrient dense and environmentally versatile.



The New 2015-2020 Dietary Guidelines

Focus on **variety**, **nutrient density**, and **amount**. “To meet nutrient needs within calorie limits, choose a *variety* of *nutrient-dense* foods across and within all food groups in recommended *amounts*.”

So then, what about amounts

Nutrients to increase:

Vegetables, fruits, whole grains, and legumes. In other words, whole foods.

Why?

Because these foods contain important macronutrients, vitamins, minerals, antioxidants, and phytochemicals, whose nutrient potential is just recently been and is being discovered.

Substances to decrease:

Overall calorie consumption, refined, added sugars, processed foods, meat and meat products.

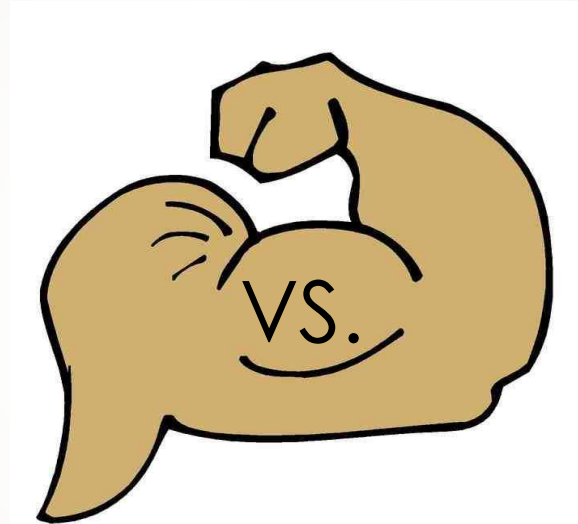
Why?

Because these substances are known to cause and/or contribute to: Diabetes, CVD, Diverticulitis, some cancers, hypertension, obesity, and a host of other health problems.

Nutritional and Environmental Sustainability


Plants

- ✓ Drought tolerant
- ✓ Ecosystem services: gives and renewably uses
- ✓ Utilizes a greenhouse gas
- ✓ Contains healthful fiber and phytochemicals
- ✓ More nutrient dense
- ✓ On average: feeds 15-23 people/2.5 acres



Animals

- ✓ Largest user of land resources
- ✓ Largest user of water resources
- ✓ Tends to be high in Saturated fats
- ✓ Produces greenhouse gases
- ✓ On average: feeds 1-2 people/2.5 acres
- ✓ zoonotic diseases (E. coli, salmonella, SARS, Bird Flu, Ebola)



Health Promotion is....“any planned combination of educational, political, environmental, regulatory, or organizational mechanisms that support actions and conditions of living conducive to the health of individuals, groups, and communities” (Joint Committee on Terminology, 2012, p. 19).

Health promotion specialists can help producers and consumers, move towards a more sustainable agriculture/food system/diet through the implementation and evaluation of the right programs

But first.....

What are the main factors influencing sustainable food production and diet?

Individual behaviors, culture, and societal norms

Example: culturally/religiously encouraged vegetarianism (like Hinduism)

Policies, both locally and globally

Example: higher taxes on processed foods

Education

Example: a consumer-friendly approach to labelling

Economics

Example: the link between income and the types of food purchased

Health outcome: for both humans and the environment

Example: one positively or negatively affects the other

Health Promotion Programs

Should:

Support these determinants and needed changes in individual behaviors and cultural traditions, policies, economics and environments in settings such as schools, worksites, health care organizations, and communities.

Information Notifies the Mind, an Experience Changes the Heart

“ ... it became apparent that as a result of being more actively involved in food preparation from the seed to the plate, there was a significant improvement in attitudes and awareness of health and food” (Lakin & Littledyke, 2008).

“...the gardening is such a great thing, it encourages love for the area, love for the city” (wakefield, Yeudall, taron, Reynolds & Skinner, 2007).

Growing evidence suggests that school-based gardening activities can encourage children to eat more fruit and vegetables and there is evidence that garden enhanced education can promote environmental awareness” (Weitkamp, Jones, Salmon, Kimberlee & Orme, 2013).

“School gardens have been shown to increase students' preferences for fruits and vegetables and increase fruit and vegetable consumption” (Beery, Adatia, Segantin & Skaer , 2014).

“...sometimes when you are stressed out... when you go to the garden, you feel different”

wakefield, Yeudall, taron, Reynolds & Skinner, 2007).

the gardens appear to have played a role in changing mindsets about healthy eating and increasing knowledge of various aspects of growing, preparing, and eating health-promoting fruits and vegetables” (Beery, Adatia, Segantin & Skaer , 2014).

“ ... teaching and learning in the school garden can make a valuable contribution to children's social, academic and emotional development, and how the sheer pleasure of creating a garden can have a ripple effect throughout the school, as others enjoy the beauty and/or the produce that result from this effort” (Passy, R., 2014).

participating in gardening activities may be an effective approach to increase young people's awareness of food related environmental issues, including sustainable production of food” (Weitkamp, Jones, Salmon, Kimberlee & Orme, 2013).

Future Plans & Interests?



<http://www.permaculture.org/>

Permaculture teaches that life is in the soil & with good soil comes nutritious food. With good soil begins water conservation, nutrient cycling, biodiversity of lifeforms and ecological resiliency/ stability. Permaculture works with plants that support beneficial insects. In permaculture gardens, food/seed security and genetic diversity are the main concern to the land stewards (Gardens: Permaculture Approach, 2014).

Why Permaculture?

society

A Global Movement
A network of interconnections without borders

Fosters Ecological Literacy
Empowerment through pattern recognition of surroundings

A Dynamic world
Responsive development to work with Nature to fulfil human needs

Honours Diversity
Culture that embraces differences and reinforces cooperation over competition

A Proactive Approach to Sustainability
Directing creative energy and regenerative actions for a better future

Strengthens Everything Local
Inclusive techniques for community self reliance and ecosystem repair

Revitalizes Soil Life
Cycles Carbon to build complexity and diversity in the soil food web

Inspires Eco-Innovation
Social/ eco entrepreneurship addresses needs and capitalizes on wastes and fulfils niche markets

Strengthens Local Economies
Purchasing local develops bio-regional enterprises which supports reskilling

A Better Tomorrow
By addressing the key issues of our time from a multitude of approaches Permaculture provides a framework for truly sustainable development

Mitigates Climate Change
Reduces strain on infrastructure and budgets from extreme climatic conditions

Green Economy
Job Creation from focused ecosystem repair and lower carbon resource development

Develops Biodiversity
Enhanced Ecosystems yielding abundance and stability

Earth Shaping
Sculpting to build natural capitol with regenerative earthworks

economy

Stable and Resilient Investment
Consistent yields relying on diversity of crops and build up of natural capitol

A High Return Potential
Premiums for products that are local or organic and minimum inputs

Poverty Alleviation
Meeting basic needs on a personal and community level

Multiple Income Streams
Promotion of a layered approach to financial security

Fulfils Full Hydrological Cycle
Recharges groundwater and creates zones of oasis

environment



Jan 4, 2014
TreeYoPermaculture.com



<http://blog.landcentral.com/land-university-blog/what-is-permaculture/#.WOWlPtLyvcs>

<https://catholicclimatemovement.global/catholics-in-action-teaching-permaculture/>