Lindheimer Chapter
Texas Waters Specialist
Education Session 3, Chapter 4

TEXAS WATERS CURRICULUM
Chapter 4: Ecosystems Services

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Define “ecosystems services”

- Wide range of conditions & processes through which natural ecosystems - and the species that are part of them - help sustain and fulfill human life
- Categories of services
  - Supporting services
  - Provisioning services
  - Regulating services
  - Cultural services

Ecosystem Goods & Services

- Ecosystem Goods (tangible benefits to humans)
  - seafood
  - wild game
  - fruits & vegetables
  - timber
  - biomass fuels
  - natural fibers
  - many pharmaceuticals
  - industrial products

- Ecosystem Services
  - purification of air & water R
  - mitigation of droughts & floods - R
  - generation & preservation of soils and renewal of their fertility - S
  - detoxification & decomposition of wastes - S
  - pollination of crops & natural vegetation - R
  - dispersal of seeds -S
  - cycling & movement of nutrients - S
  - control of agricultural pests - R
  - maintenance of biodiversity - S
  - protection of coastal shores from erosion by waves - R
  - protection from sun's UV rays - R
  - partial stabilization of climate - R
  - moderation of weather extremes & their impacts - R
  - places to recreate - C
  - provision of aesthetic beauty & intellectual stimulation that lift the human spirit - C

Supporting Services - Functions that maintain all other services

Provisioning Services - Goods or products produced by ecosystems

Regulating Services - Natural processes regulated by ecosystems

Culture Services – Lift the human spirit

Four Categories of Ecosystem Services

Supporting Services

Functions that maintain all other services

- Nutrient cycling
- Soil formation
- Primary productions (i.e., the resources used for agriculture & farming)

Provisioning Services

Goods or products produced by ecosystems

- Food
- Fresh water
- Wood & fiber
- Fuel

Categories of Services, continued

Regulating Services

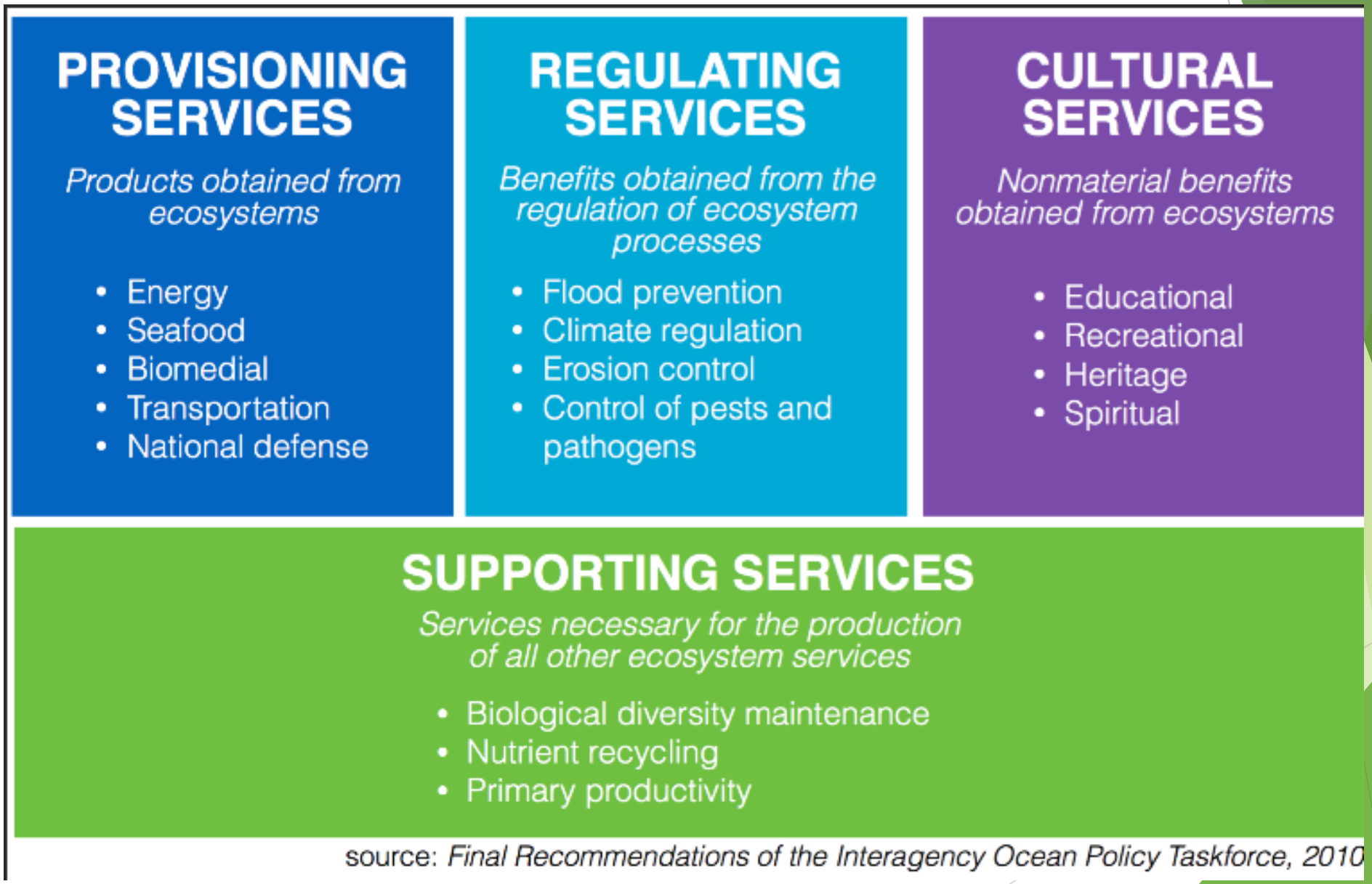
Natural processes regulated by ecosystems

- Climate regulation
- Food regulation
- Water purification

Cultural Services

Intangible benefits obtained from ecosystems

- Aesthetic
- Recreational
- Educational
- Spiritual


PROVISIONING SERVICES
Products obtained from ecosystems
• Energy
• Seafood
• Biomedial
• Transportation
• National defense
REGULATING SERVICES
Benefits obtained from the regulation of ecosystem processes
• Flood prevention
• Climate regulation
• Erosion control
• Control of pests and pathogens
CULTURAL SERVICES
Nonmaterial benefits obtained from ecosystems
• Educational
• Recreational
• Heritage
• Spiritual
SUPPORTING SERVICES
Services necessary for the production of all other ecosystem services
• Biological diversity maintenance
• Nutrient recycling
• Primary productivity
source: Final Recommendations of the Interagency Ocean Policy Taskforce, 2010

VIDEO: What is nature worth? (3:15)
by University of Minnesota

https://youtu.be/TartoYpK1yI

- Plants, animals, even entire ecosystems are disappearing from the Earth. So what? In "What Is Nature Worth?", the University of Minnesota's Institute on the Environment offers a three-minute look at what biodiversity loss is really costing us -- and what we can do about it.

Chapter 4:
Questions to Consider

- What are ecosystems services?
- What natural systems protect human settlements from flood and drought?
- What does soil do for humanity?
- What other ecosystem services are happening all around me, without my notices.

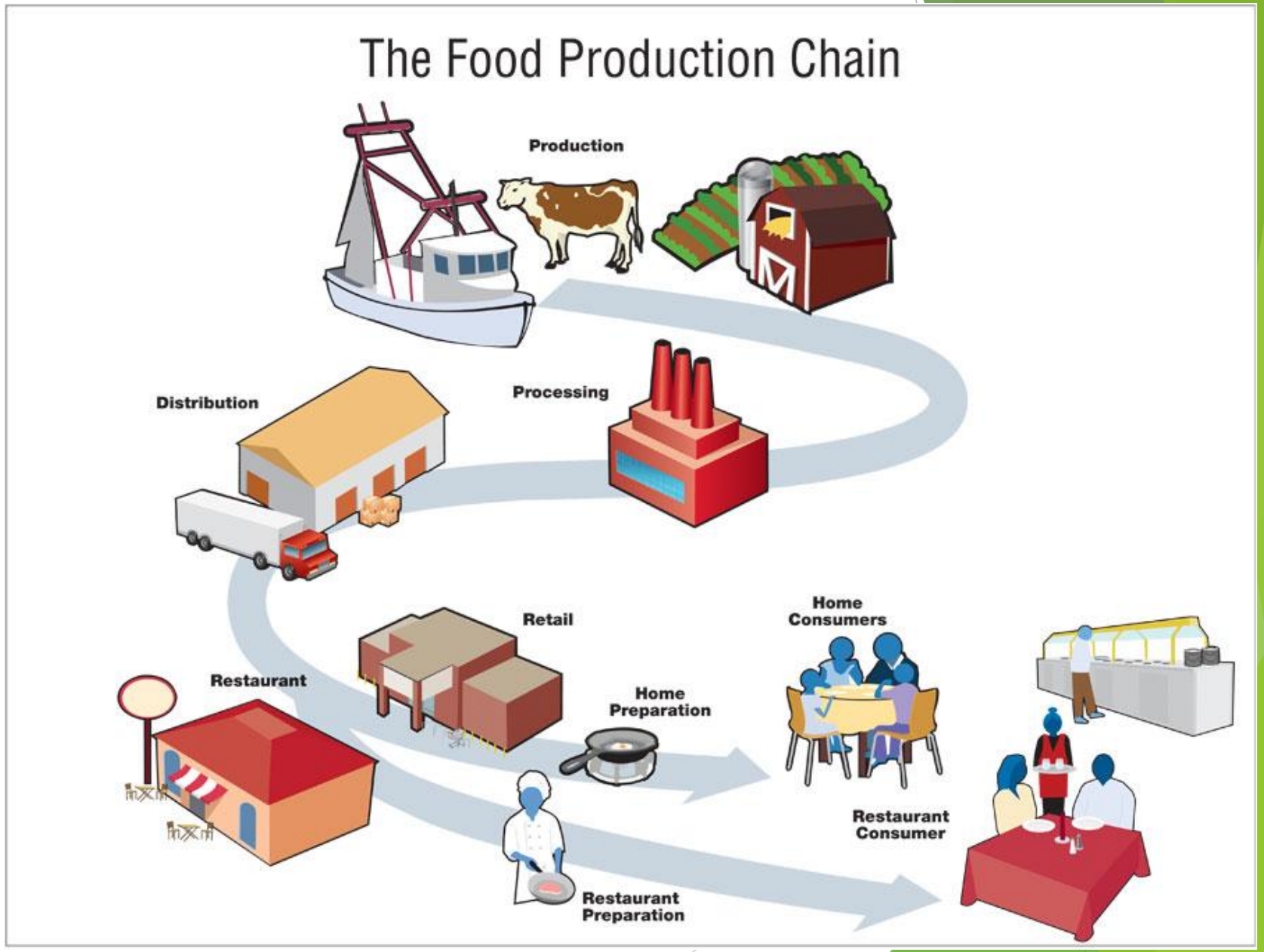
Challenge Activities

- Consider the ecosystem services required to produce the food items from your last meal.
  - Be sure to include all of the biotic & abiotic factors that contributed to your food.
  - Consider the resources consumed in getting your food from where it grew to where you consumed it.
- In what ways does your personal consumption affect the ecosystem other than the one in which you live?

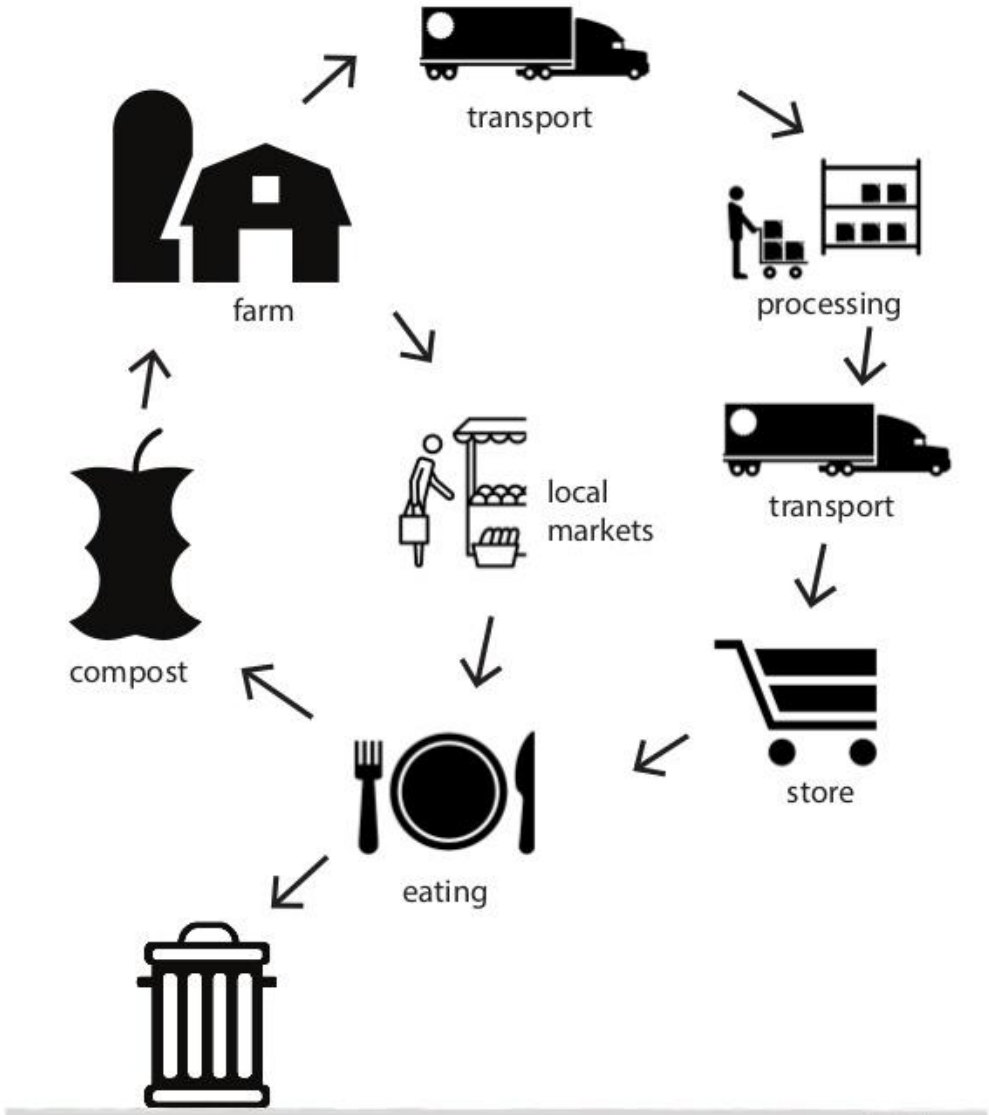
Track
Your
Lunch

Bing Videos
https://www.bing.com/videos/riverview/relatedvideo?q=track+your+lunch+from+farm+to+table&mid=36D23998940F36BCDCAF36D23998940F36BCDCAF&FORM=VIRE

http://www.eatingwell.com/article/10290/trace-your-food/



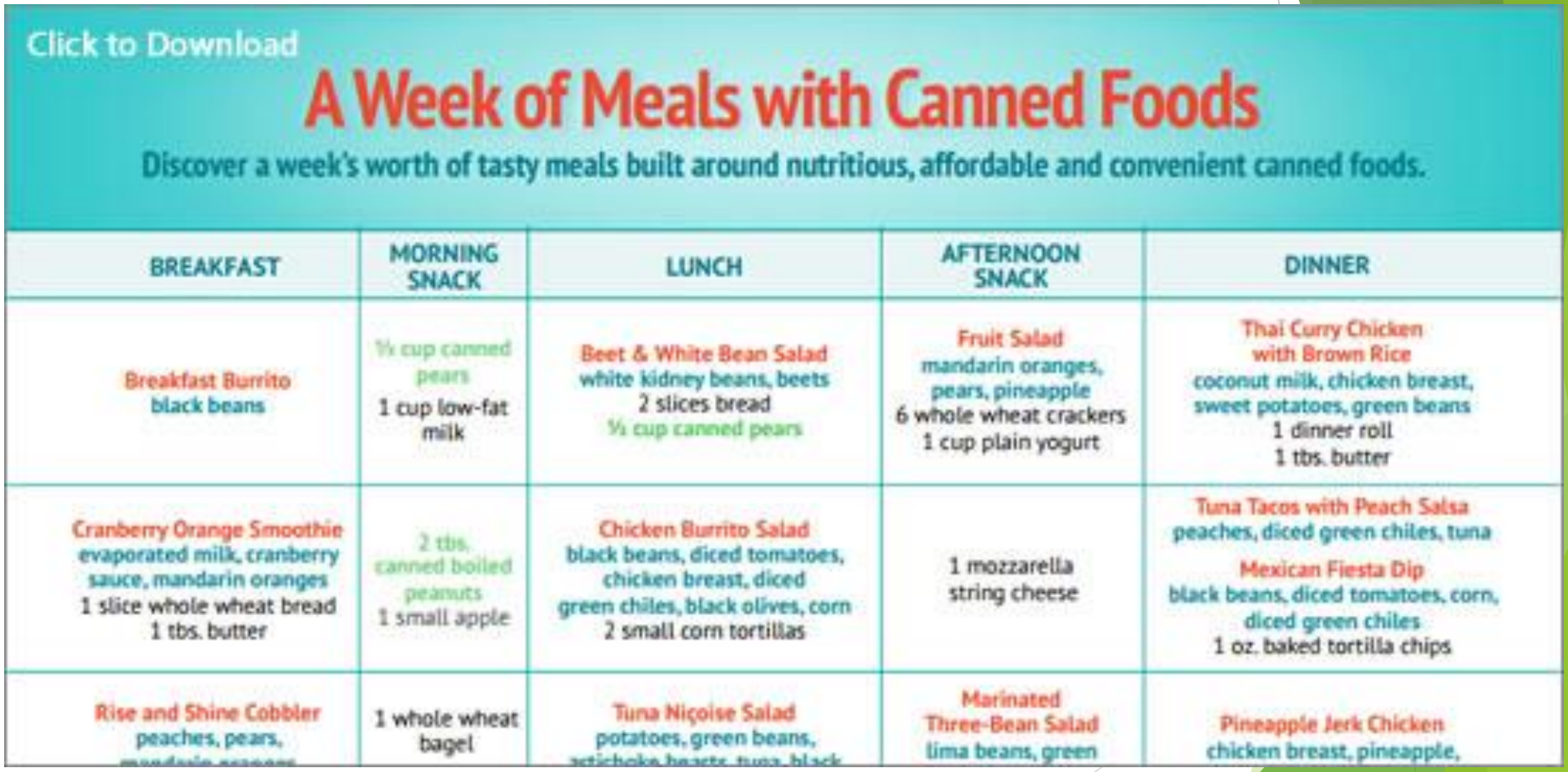
FOOD SYSTEM DIAGRAM



APPENDIX 1B

www.campuskitchens.org

Or, you can just give in & not eat real food at all…

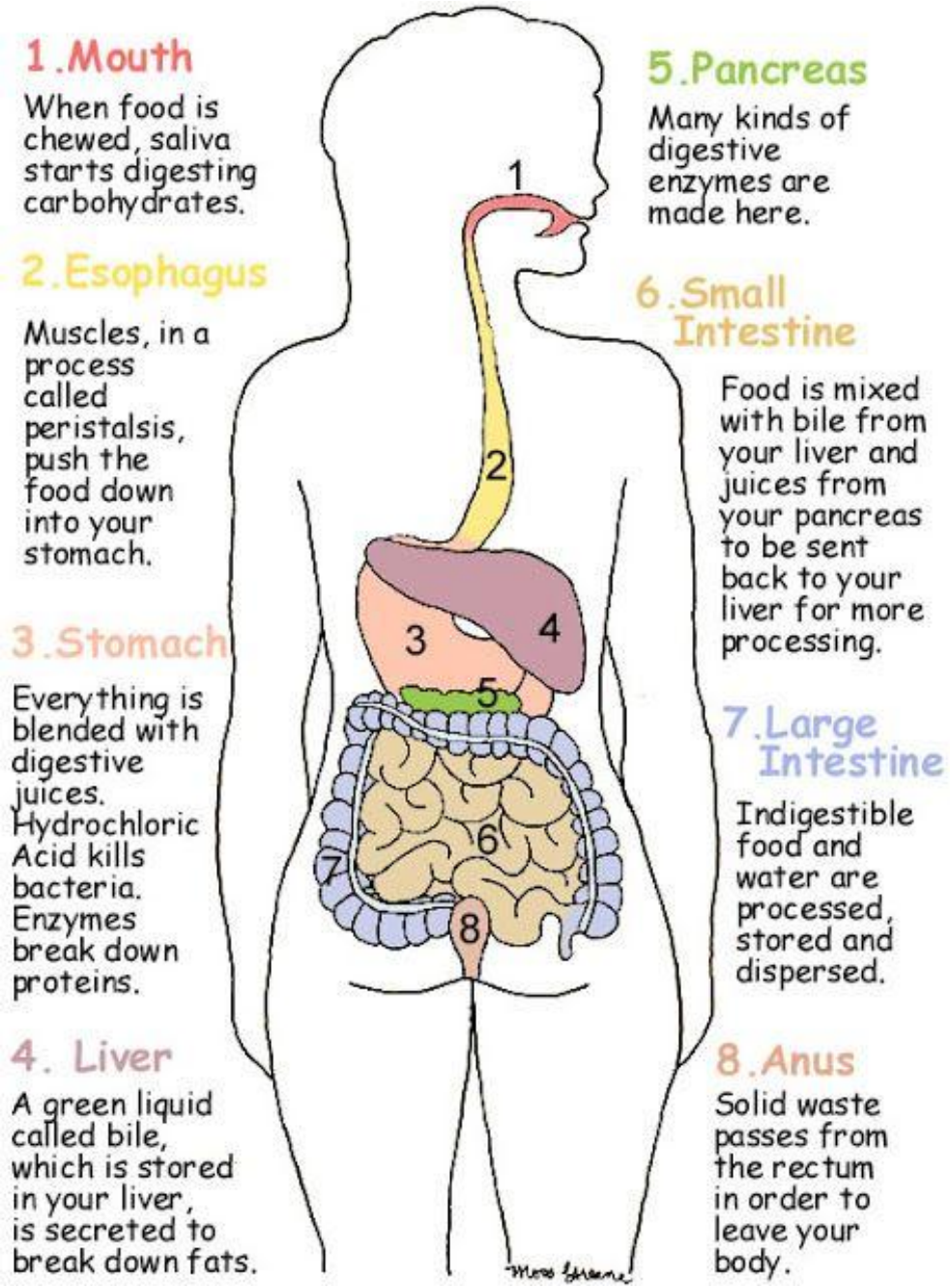


Click to Download

A Week of Meals with Canned Foods

Discover a week's worth of tasty meals built around nutritious, affordable and convenient canned foods.

BREAKFAST	MORNING SNACK	LUNCH	AFTERNOON SNACK	DINNER
Breakfast Burrito black beans	½ cup canned pears 1 cup low-fat milk	Beet & White Bean Salad white kidney beans, beets 2 slices bread ½ cup canned pears	Fruit Salad mandarin oranges, pears, pineapple 6 whole wheat crackers 1 cup plain yogurt	Thai Curry Chicken with Brown Rice coconut milk, chicken breast, sweet potatoes, green beans 1 dinner roll 1 tbs. butter
Cranberry Orange Smoothie evaporated milk, cranberry sauce, mandarin oranges 1 slice whole wheat bread 1 tbs. butter	2 tbs. canned boiled peanuts 1 small apple	Chicken Burrito Salad black beans, diced tomatoes, chicken breast, diced green chiles, black olives, corn 2 small corn tortillas	1 mozzarella string cheese	Tuna Tacos with Peach Salsa peaches, diced green chiles, tuna Mexican Fiesta Dip black beans, diced tomatoes, corn, diced green chiles 1 oz. baked tortilla chips
Rise and Shine Cobbler peaches, pears,	1 whole wheat bagel	Tuna Niçoise Salad potatoes, green beans,	Marinated Three-Bean Salad lima beans, green	Pineapple Jerk Chicken chicken breast, pineapple,



Where does food & water go when we've processed it?

(and what ecosystem service is this?)

Supporting

HOMEWORK ☺
VIDEO: Understanding Ecosystem Services (3:52)
https://youtu.be/xbNREzRj5RU

- What does the natural world mean in monetary terms, beyond the idea of raw materials? Conservation International Executive VP Jennifer Morris believes it is critically important quantify the value of "ecosystem services," those resources and processes nature provides for planet and human survival. She shares two quantifiable examples: the value of insect pollination to agriculture, and the pharmaceutical industry's dependence on natural plant resources.

Threats to Ecosystem Services

- Alteration and loss of habitats
- Introduction of exotic species and genetically modified organisms (GMOs)
- Pollution
- Climate change
- Overexploitation of resources

JUST FYI: IPBES 2019 GLOBAL ASSESSMENT REPORT ON BIODIVERSITY AND ECOSYSTEM SERVICES

https://www.nationalgeographic.com/environment/2019/05/ipbes-un-biodiversity-report-warns-one-million-species-at-risk/

- First ever inter-governmental global assessment on biodiversity whose aim is to inform better policies and actions towards the protection of biodiversity in the coming years.
- Prepared by 150 leading experts from 50 countries + the support of other 250 experts collaborating to the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)
- Covers all land-based ecosystems (except Antarctica), inland water and the open oceans
  - Evaluates changes over the past 50 years — and implications for our economies, livelihoods, food security and quality of life.
  - Explores impacts of trade and other global processes on biodiversity and ecosystem services
  - Ranks the relative impacts of climate change, invasive species, pollution, sea and land use change and a range of other challenges to nature
  - Identifies priority gaps in our available knowledge that will need to be filled
  - Projects what biodiversity could look like in decades ahead under six future scenarios: Economic Optimism; Regional Competition; Global Sustainability; Business as Usual; Regional Sustainability and Reformed Markets
  - Assesses policy, technology, governance, behaviour changes, options and pathways to reach global goals by looking at synergies and trade-offs between food production, water security, energy and infrastructure expansion, climate change mitigation, nature conservation and economic development

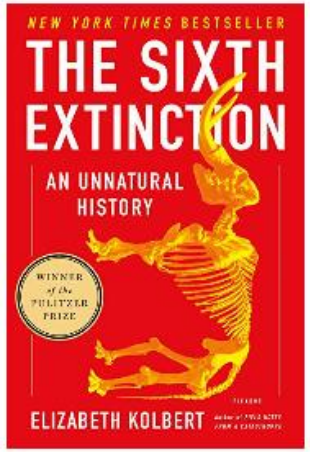
VIDEO: “Ecosystems Services”
by California Academy of Sciences (9:02)

https://youtu.be/BCH1Gre3Mg0

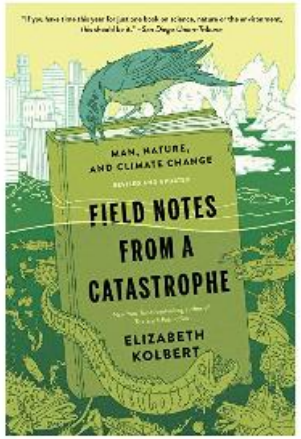
- Why is biodiversity essential to humans?

Just FYI: Recommended Reading on Extinction/Climate
(for all that spare time that you have)

- The Sixth Extinction by Elizabeth Kolbert (Book)



- Field Notes From A Catastrophe by Elizabeth Kolbert



- FYI - From the Center for Biological Diversity, here's an article called "The Extinction Crisis"

https://www.biologicaldiversity.org/programs/biodiversity/elements_of_biodiversity/extinction_crisis/

Next up: Chapter 5