

Best Practices for Efficient Irrigation and Water Quality

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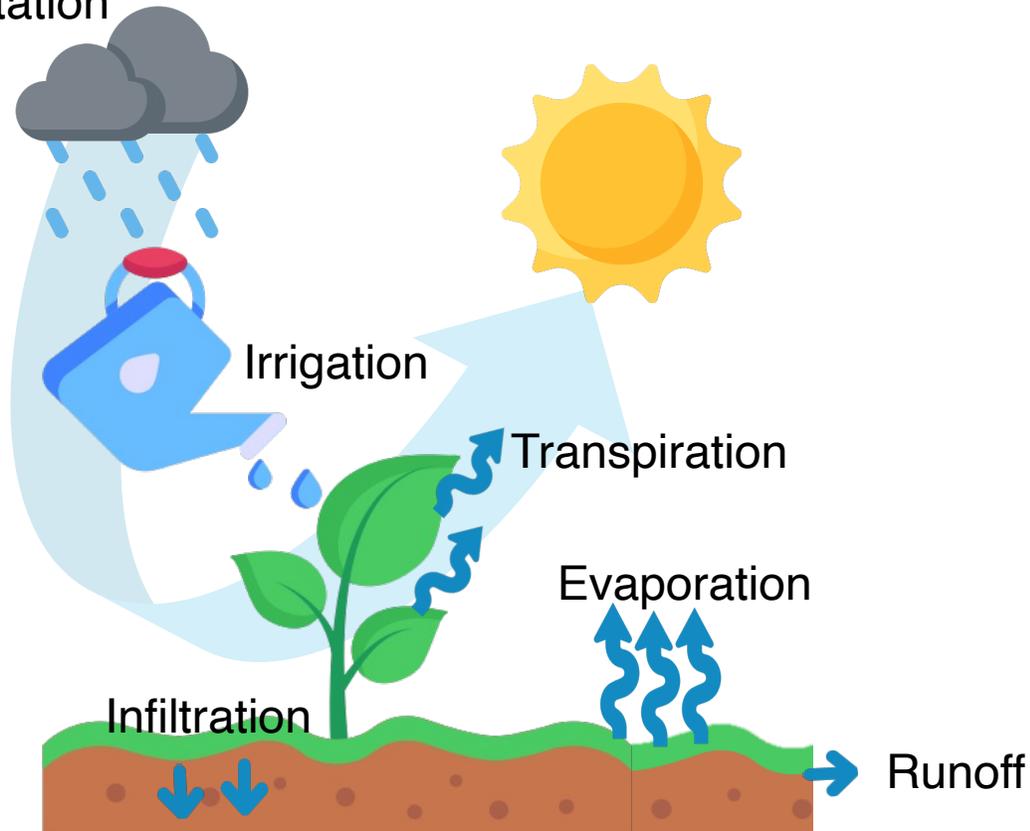
Water and Climate Change advisor

UC Cooperative Extension

Mendocino and Lake Counties

WATER BUDGET

Precipitation

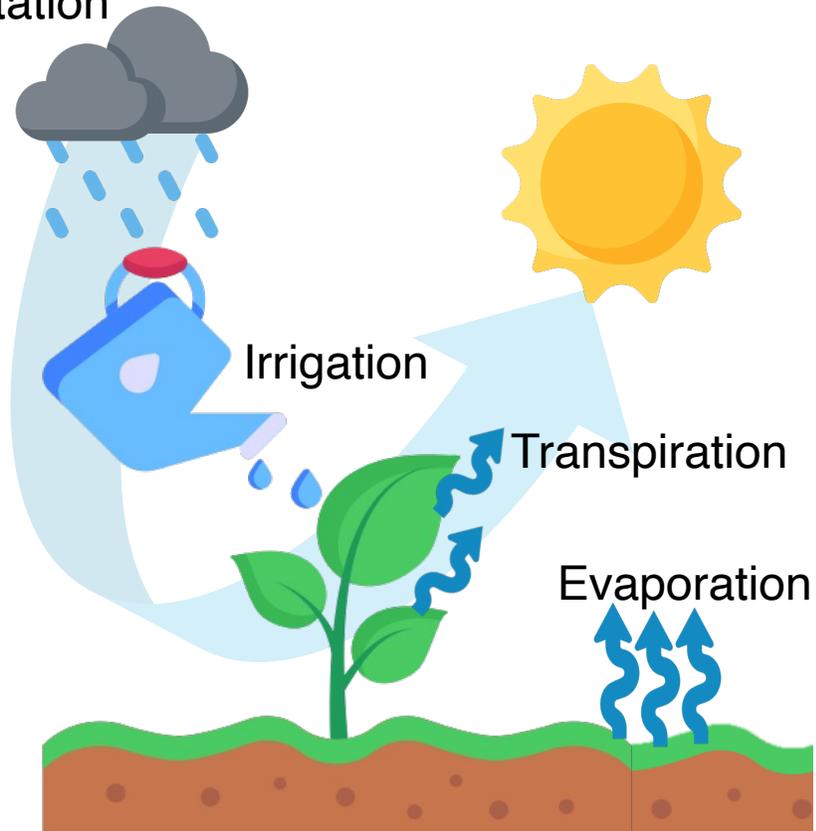


The water budget is a way to measure how much water enters and leaves an area.

WATER BUDGET

Irrigation

Precipitation



Evapotranspiration (ET)

Loss of water through
Evaporation + Transpiration



Soil



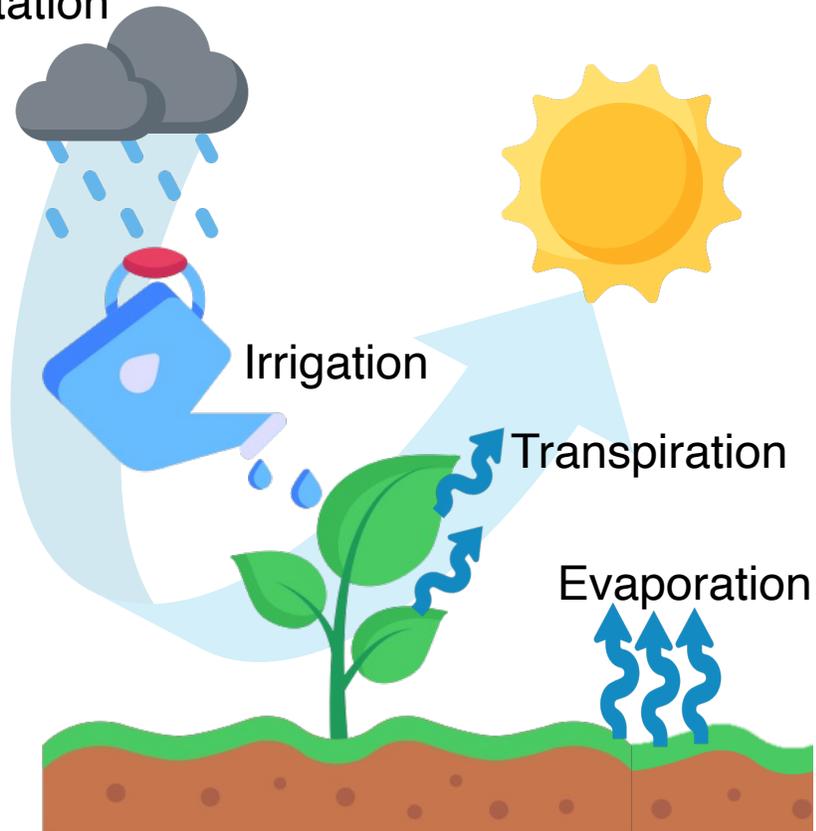
Plants

ET = Crop water needs

WATER BUDGET

Irrigation

Precipitation



Factors Affecting Evapotranspiration (ET)

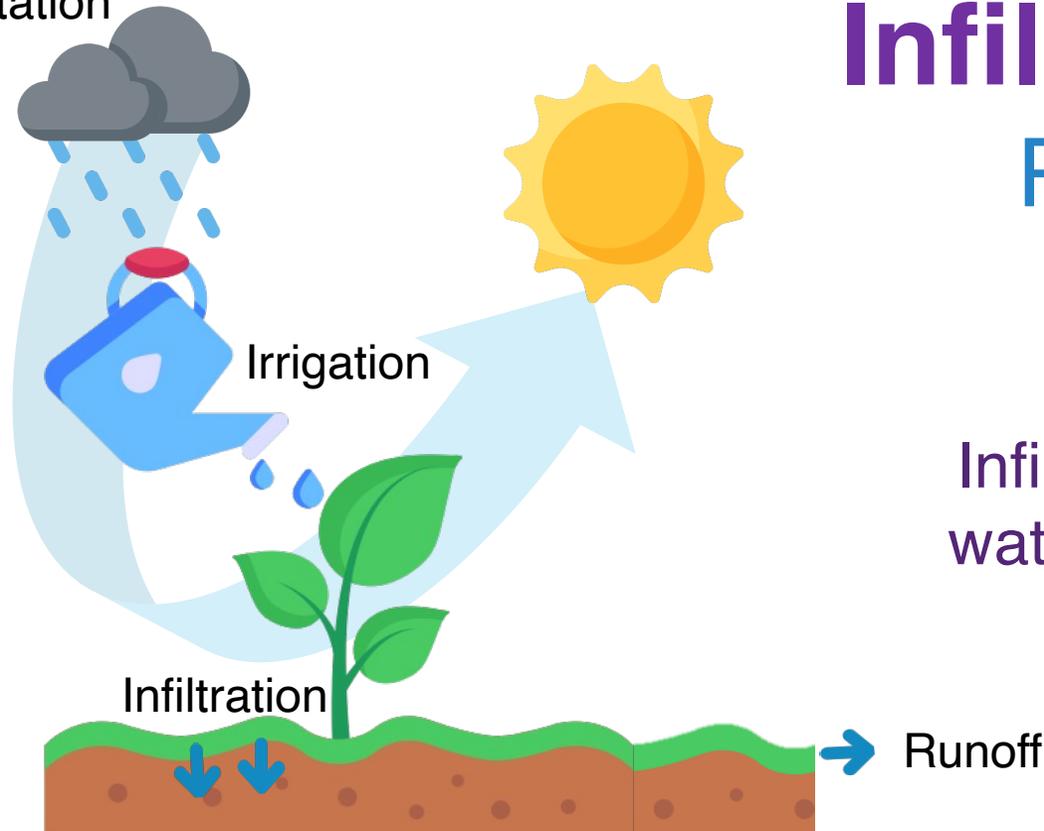
- Temperature
- Wind
- Soil Moisture
- Solar Radiation
- Region / Altitude

ET = Crop water needs

WATER BUDGET

Water Quality

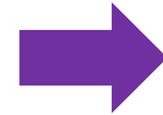
Precipitation



Infiltration and Runoff Pollutant Transport



Infiltrate in
water table

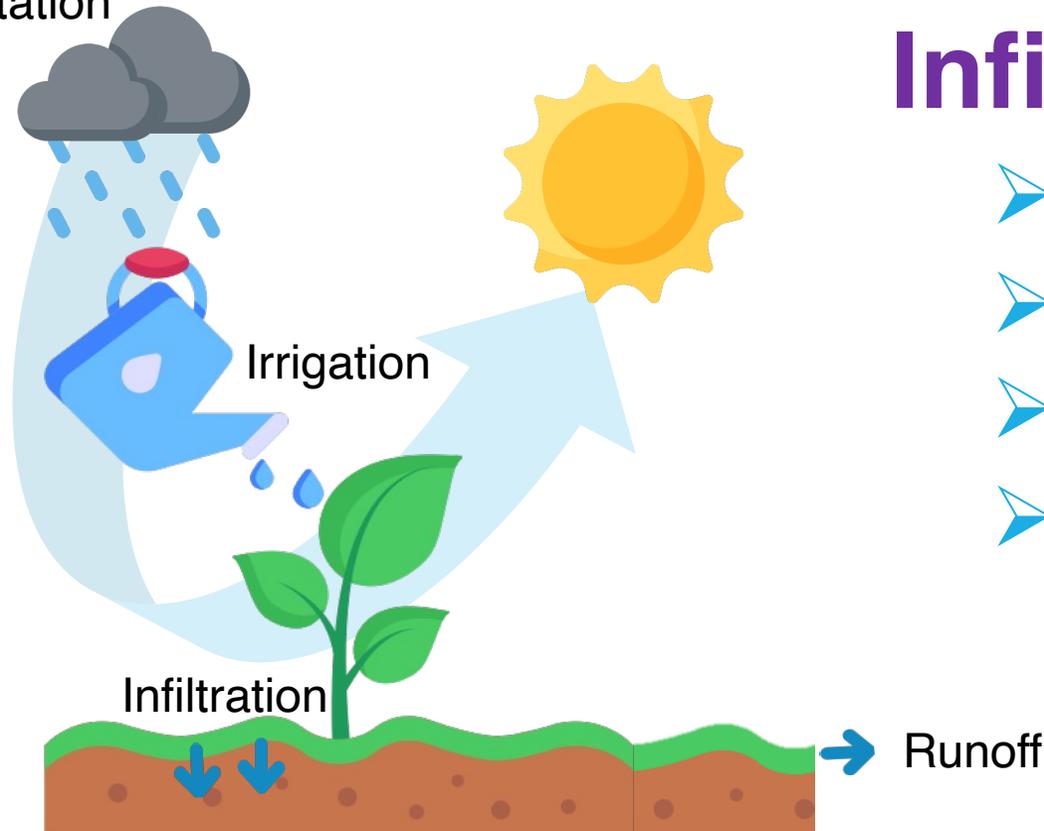


Runoff to streams,
lakes, ocean

WATER BUDGET

Water Quality

Precipitation

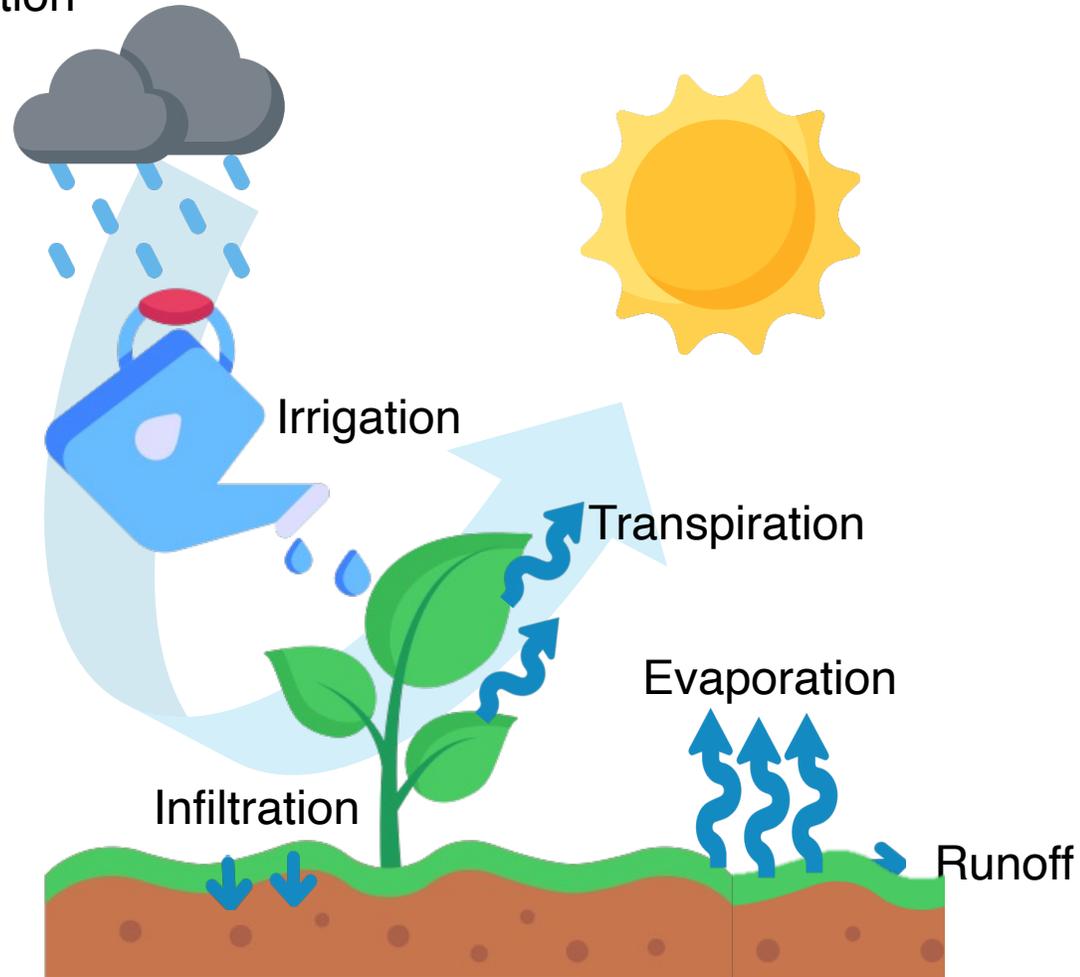


Factors Affecting Infiltration and Runoff

- Slope
- Permeability
- Saturation of soil
- Vegetation cover

WATER BUDGET

Precipitation



BEST PRACTICES FOR IRRIGATION AND WATER QUALITY



Efficient
Practices

Irrigation
Scheduling

Water Quality
Practices

Monitoring and
Maintenance

IRRIGATION EFFICIENCY

Volume of water applied to the crop compared to the volume of water required by the crop for its irrigation requirement.

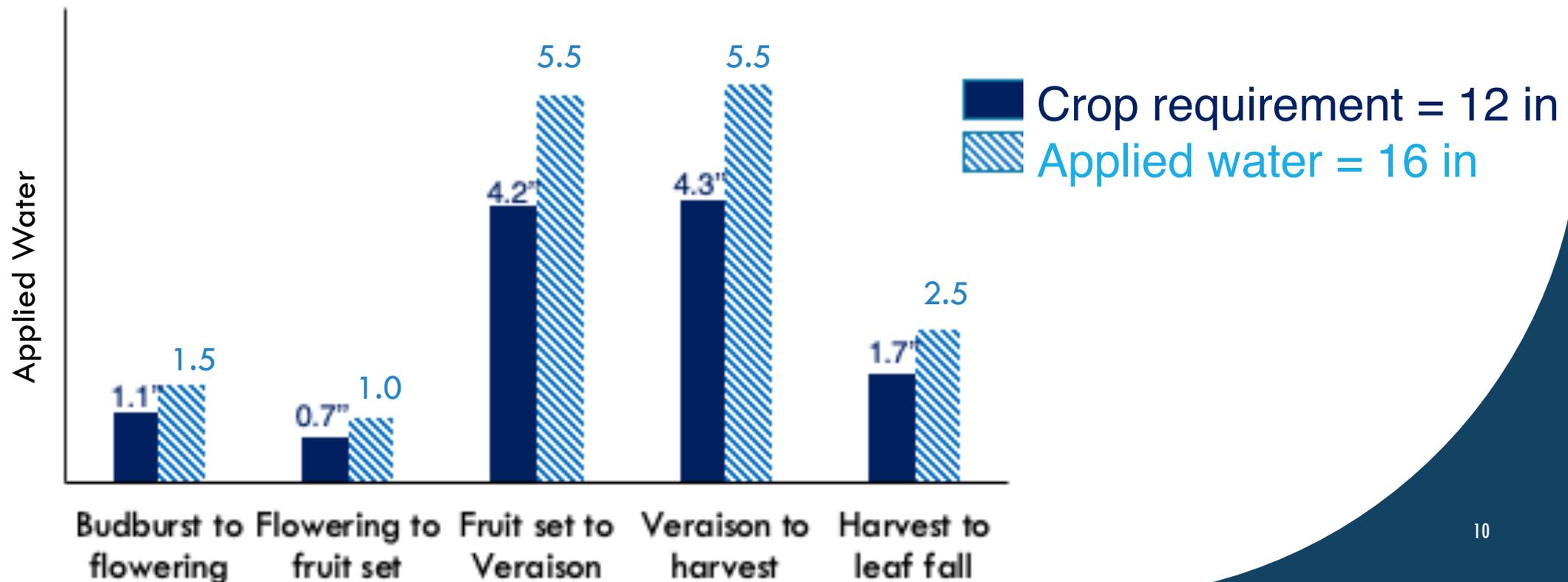
Efficient Practices

Irrigation Scheduling

Water Quality Practices

Monitoring and Maintenance

IRRIGATION EFFICIENCY



Efficient Practices

Irrigation Scheduling

Water Quality Practices

Monitoring and Maintenance

IRRIGATION EFFICIENCY

How efficient was our irrigation application?



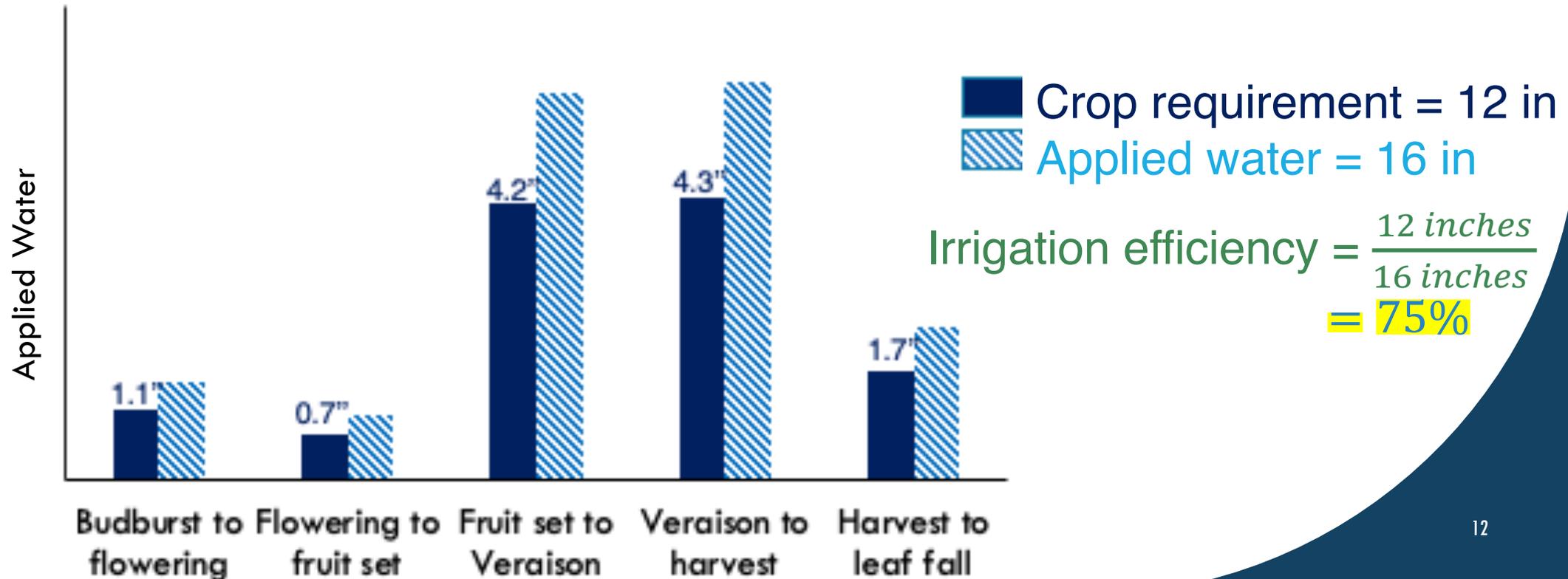
Efficient Practices

Irrigation Scheduling

Water Quality Practices

Monitoring and Maintenance

IRRIGATION EFFICIENCY



Efficient Practices

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Water Quality Practices

Monitoring and Maintenance

IRRIGATION EFFICIENCY

Can we improve our irrigation efficiency?



Efficient
Practices

Irrigation
System Design

Irrigation
Scheduling

Monitoring and
Maintenance

Irrigation Systems



Surface

Application efficiency: 50 – 75%



Sprinklers

Application efficiency: 70 – 90%



Microirrigation

Application efficiency: 85 – 95%

Factors to think about:

- natural conditions
- type of crop
- type of technology
- previous experience
- required labor inputs
- costs and benefits.

Efficient
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Maintenance

Irrigation Scheduling

Irrigation scheduling involves planning when and how much water to apply

Efficient
Irrigation
Practices

Irrigation
System Design

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Maintenance

Irrigation Scheduling

Irrigation scheduling involves planning when and how much water to apply

Soil-based



Weather ET-based



Efficient
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Maintenance

Irrigation Scheduling

Weather ET-based



Crop water Needs

$$ET_{\text{crop}} = ET_{\text{ref}} \times K_{\text{crop}}$$



Evapotranspiration
of my crop = is my
crop water needs

Efficient Practices

Irrigation Scheduling

Water Quality Practices

Monitoring and Maintenance

Irrigation Scheduling

Weather ET-based



Crop water Needs

$$ET_{crop} = ET_{ref} \times K_{crop}$$



Reference ET is the water needs of grass



Efficient Practices

Irrigation Scheduling

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Weather ET-based

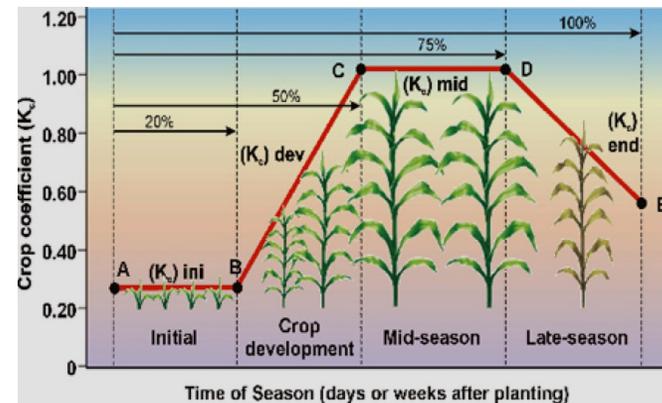


Crop water Needs

$$ET_{crop} = ET_{ref} \times K_{crop}$$



K_c is the crop coefficient. It represents the integrated changes in plant development



Date	K_c (W. Grape)
Mar 16-31	0.32
Apr 1-15	0.41
Apr 16-30	0.50
May 1-15	0.59
May 16-31	0.69
June 1-15	0.78
Jun 16-31	0.82
July 1-15	0.82
July 16-31	0.82
Aug 1-15	0.82
Aug 16-31	0.77
Sep 1-15	0.66
Sep 16-30	0.55
Oct 1-15	0.44

Crop Coefficient Values of Wine Grapes
(UC Cooperative Extension)

Efficient Practices

Irrigation Scheduling

Water Quality Practices

Monitoring and Maintenance

Irrigation Scheduling Tools

Login | Register

CIMIS

CALIFORNIA IRRIGATION MANAGEMENT INFORMATION SYSTEM
CALIFORNIA DEPARTMENT OF WATER RESOURCES

HOME STATIONS DATA SPATIAL RESOURCES

Notices

FTP has been updated to SFTP at [sftp://sftp.cimis.water.ca.gov](http://sftp.cimis.water.ca.gov) (Host). Contact us for Username and Password.

Use Filezilla or WinSCP to access the upgraded SFTP data interface

Station List Station Location Map Siting Sensors Maintenance

This Bing Map shows CIMIS station coordinate points. You can zoom in and out to see the exact station locations. Click the station marker for more detailed information.

Active Stations
 Inactive Stations

CropManage: Online irrigation and nitrogen management decision support

☆ broccoli example

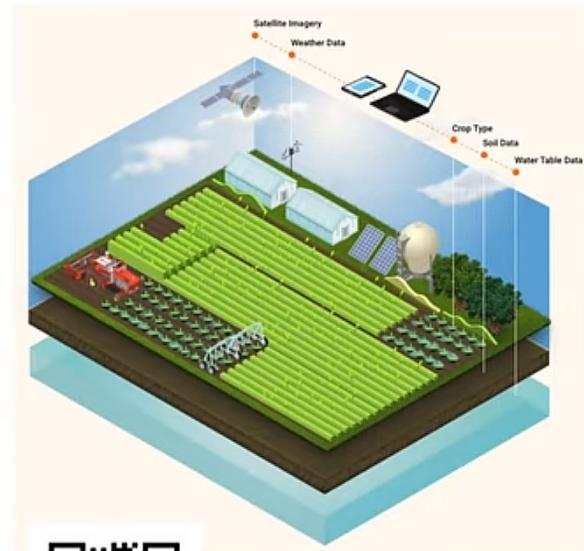
1 Oct 2022 - 31 Mar 2023

Tasks History

COMPLETED

JAN 17	20-0-0-5	10 gal/acre
JAN 16	Tissue Sample	4.1% Nitrogen
JAN 11	Drip	3.3 hr
JAN 6	Drip	3.2 hr
JAN 3	Drip	3.4 hr
DEC 30	Drip	3.1 hr
DEC 28	Drip	3.9 hr
DEC 23	Drip	3.2 hr

View all events by: [List] [Calendar] [Map]



cropmanage.ucanr.edu

Efficient Practices

Irrigation Scheduling

Water Quality Practices

Monitoring and Maintenance

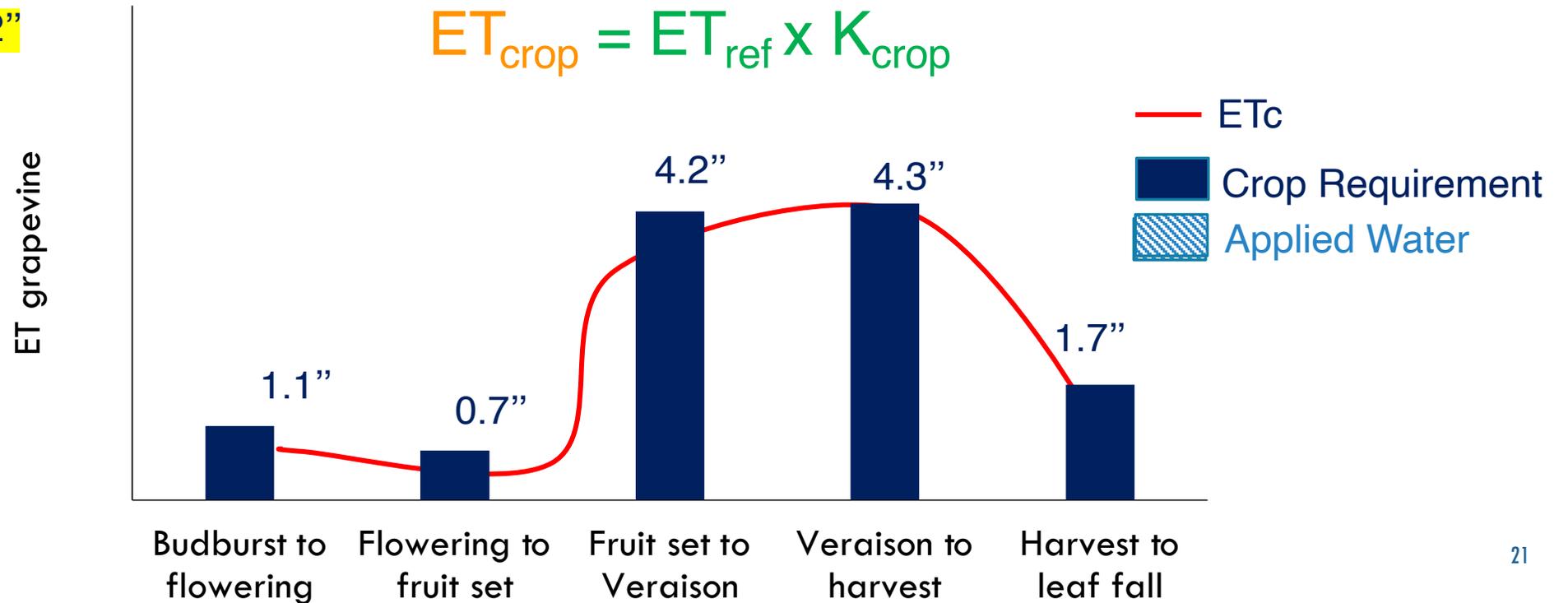
Irrigation Scheduling

Weather ET-based

Crop requirement is 12"

Crop water Needs

$$ET_{crop} = ET_{ref} \times K_{crop}$$



Efficient Practices

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Irrigation Scheduling

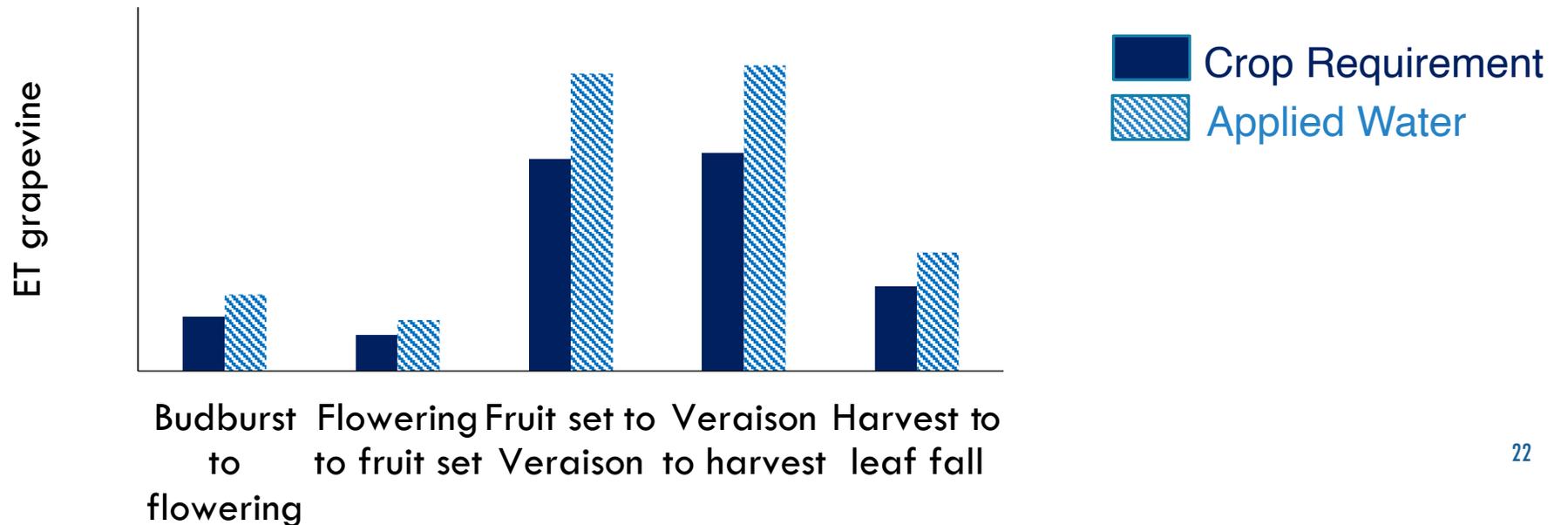
Weather ET-based

Crop requirement is 12" but initially we applied 16"

Irrigation efficiency
75%

Crop water Needs

$$ET_{crop} = ET_{ref} \times K_{crop}$$



Efficient Practices

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Irrigation Scheduling

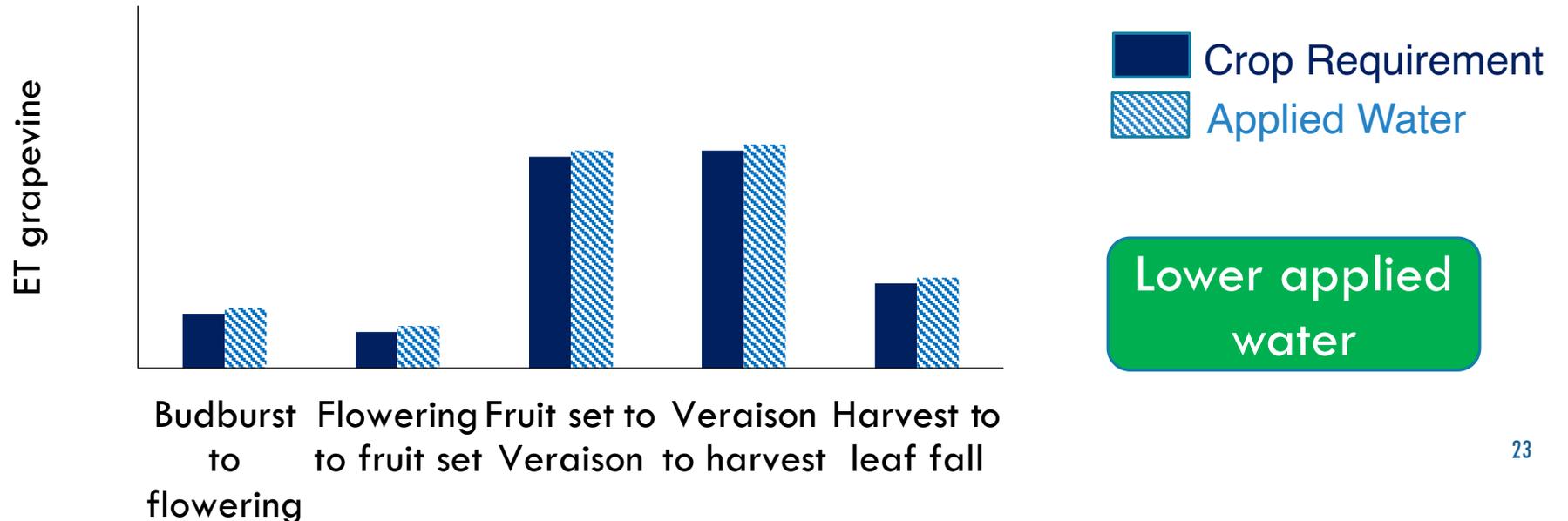
Weather ET-based

Crop requirement is 12" but now we applied 12.7"

Irrigation efficiency 95%

Crop water Needs

$$ET_{crop} = ET_{ref} \times K_{crop}$$



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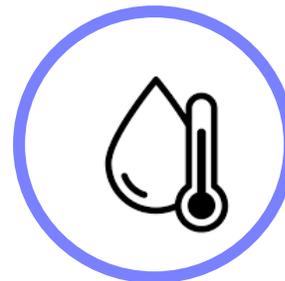
Monitoring and
Maintenance

WATER QUALITY

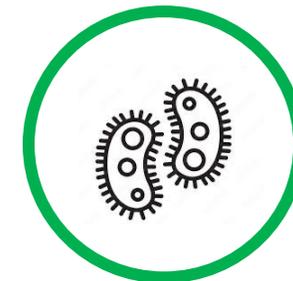
How clean or safe water is based on chemical, physical, and biological properties that determine its suitability for drinking, irrigation, or supporting aquatic life.



Chemical



Physical



Biological

Efficient Practices

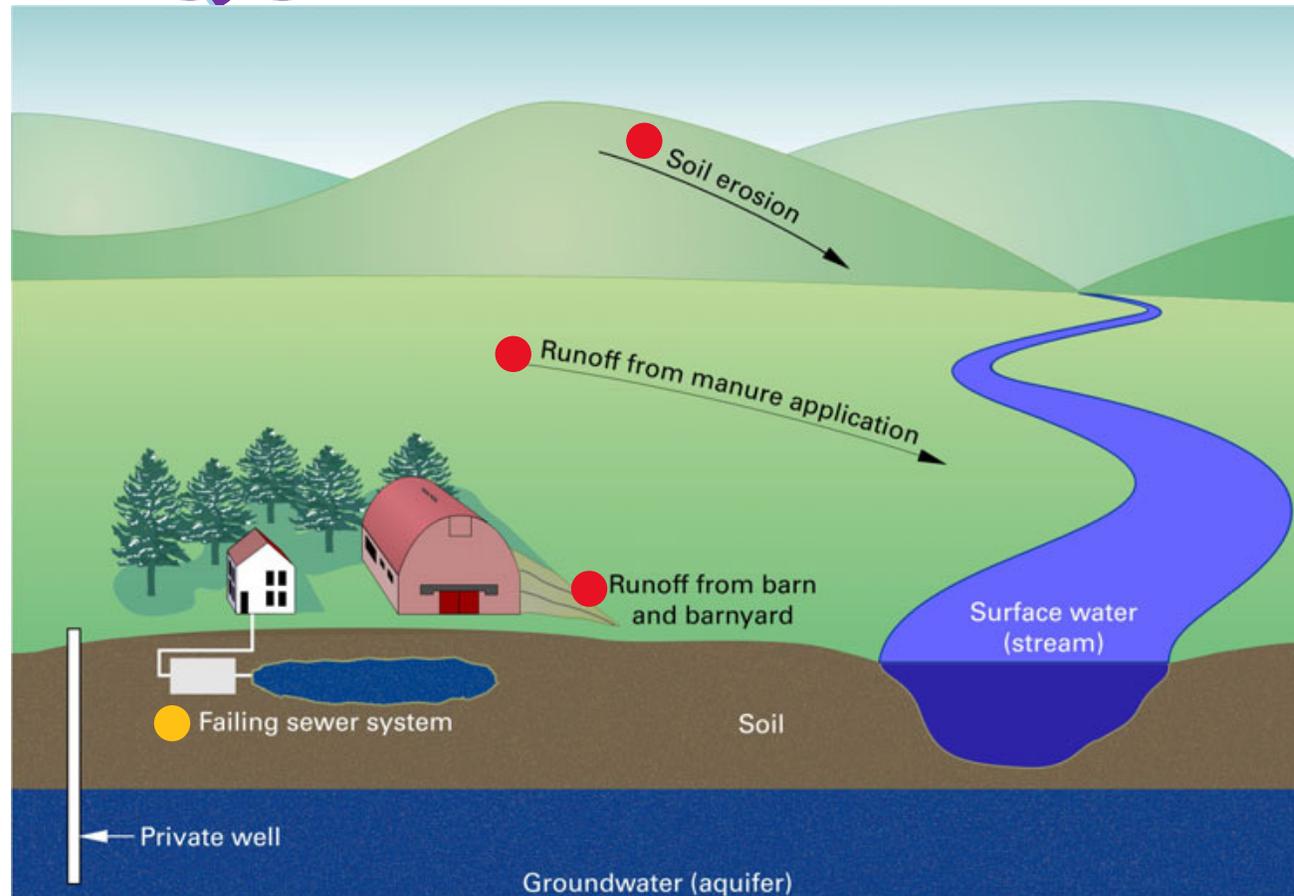
Irrigation Scheduling

Water Quality Practices

Monitoring and Maintenance

WATER QUALITY

Point Source Pollution



Non Point Source Pollution

Efficient Practices

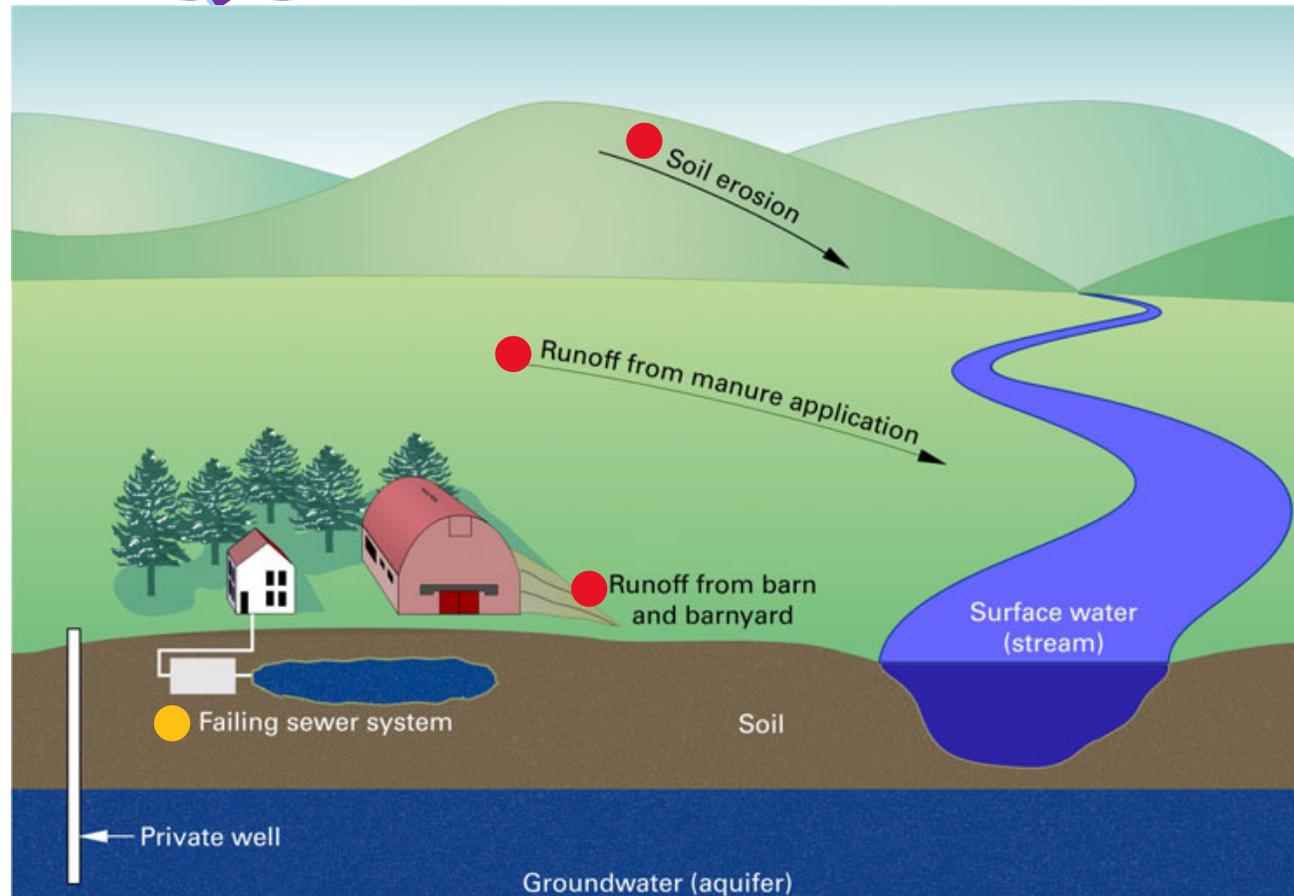
Irrigation Scheduling

Water Quality Practices

Monitoring and Maintenance

WATER QUALITY

Point Source Pollution



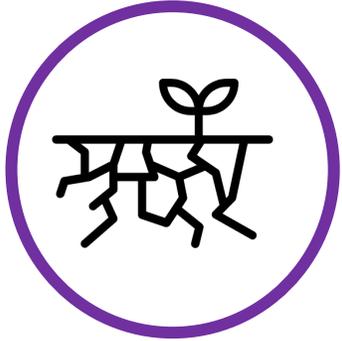
Non Point Source Pollution

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Prevent Erosion

- Conservation Tillage
- Cover Crops

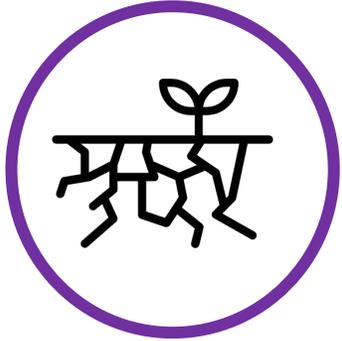


Efficient Practices

Irrigation Scheduling

Water Quality Practices

Monitoring and Maintenance



Prevent Erosion

- Conservation Tillage
- Cover Crops



Enhance Management

- Integrated Pest and Nutrient Management
- Efficient Irrigation Techniques

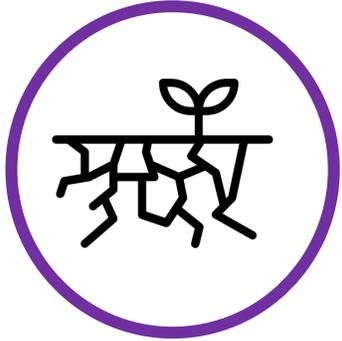


Efficient Practices

Irrigation Scheduling

Water Quality Practices

Monitoring and Maintenance



Prevent Erosion

- Conservation Tillage
- Cover Crops



Enhance Management

- Integrated Pest and Nutrient Management
- Efficient Irrigation Techniques



Improve Filtration

- Riparian buffers
- Cover crops/Filter strips



Efficient Practices

Irrigation Scheduling

Water Quality Practices

Monitoring and Maintenance

Efficient
Practices

Irrigation
Scheduling

Water Quality
Practices

Monitoring and
Maintenance

Monitoring and Maintenance

Assess your
irrigation
system

Install
monitoring
devices and
tools

Inspections
and
maintenance

Efficient Practices

Irrigation System Design

Irrigation Scheduling

Monitoring and Maintenance

Increase yields

Conserve Water

Enhance Water Quality

Reduced costs

Drought Adaptation

BENEFITS OF EFFICIENT PRACTICES

THANK YOU!

Laura Garza

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Mendocino and Lake Counties

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