**Workshop Followup Materials**

We seek to describe vineyards as a complex system, by agreeing upon the structure of a Bayesian Network. This involves including any further important variables, decisions and effects within vineyards as nodes. And linking these nodes together to describe whether they effect each other; which we call defining the causal relationships.

The attached document contains:

* An example of editing a node.
* A summary table of nodes, their connections and data sources.
* Graphical outline of the graph structure

Due to the complexity of the current graph structure I have also included smaller graphical representations of the nodes with greater than 4 connections, for:

* Water (Mega litres used)
* Pest and disease management
* Fuel
* Environmental Impact

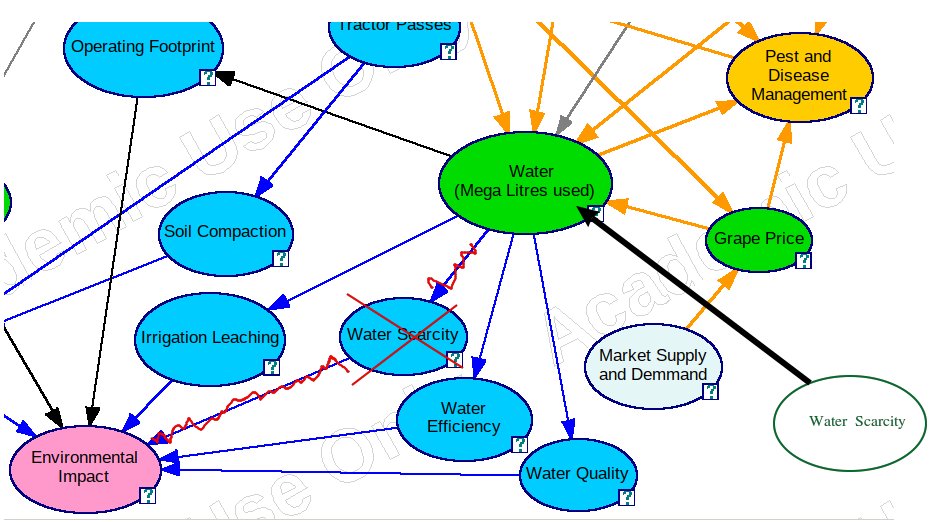
These materials can be edited and returned to help construct further networks, and approach an agreeable system that usefully describe vineyards, their operations and influencing factors. If you would prefer the materials in a different format please ask and I will do my best to deliver them for you.

There are several further points to emphasis:

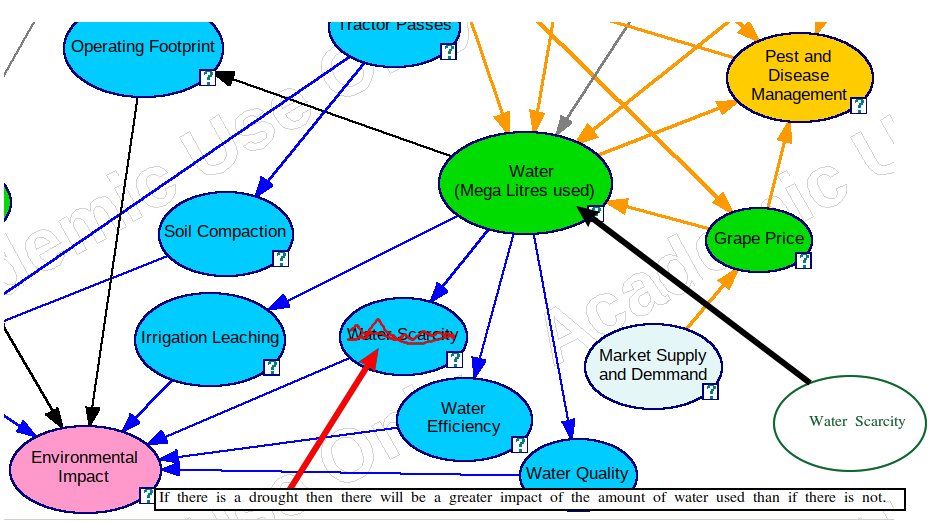
* Connections have to be one directional.
* If a node is included that does not have data we will have to decide upon how the node impacts those that it is connected with.
* For some nodes which have wide reaching effects upon upon the network, such as region and year. We can define specific models for these to describe these circumstances.
* For groups of nodes that can be formed into sub-systems, such as organic farming, agro-chemical mix and cover crops; we can describe a sub-system that can be switched in and out depending on the specific circumstance of a vineyard. To highlight that these are subsystems take note or draw a box around and specify the collection of nodes that can be interchanged.

**Example:**

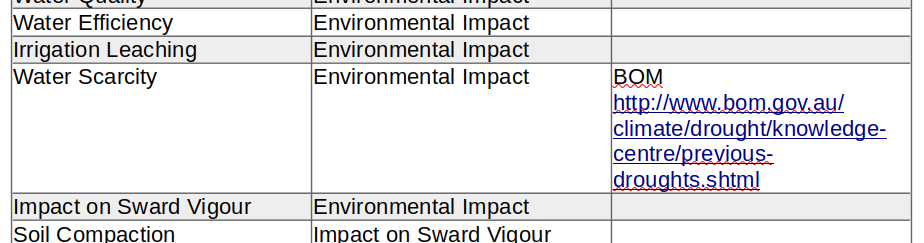
In this example we disagree with the amount of water effecting water scarcity. So we remove it, here I edit the image using paint to indicate the change:



However, afterwards I consider that the amount of water being used will have a higher environmental impact if there is a drought, or water scarcity. So I decided to add the node back and make a note of the difference between the nodes:



If you had a specific dataset you wanted to include for water scarcity you can use the table or write it onto the diagram, what ever best suits you:



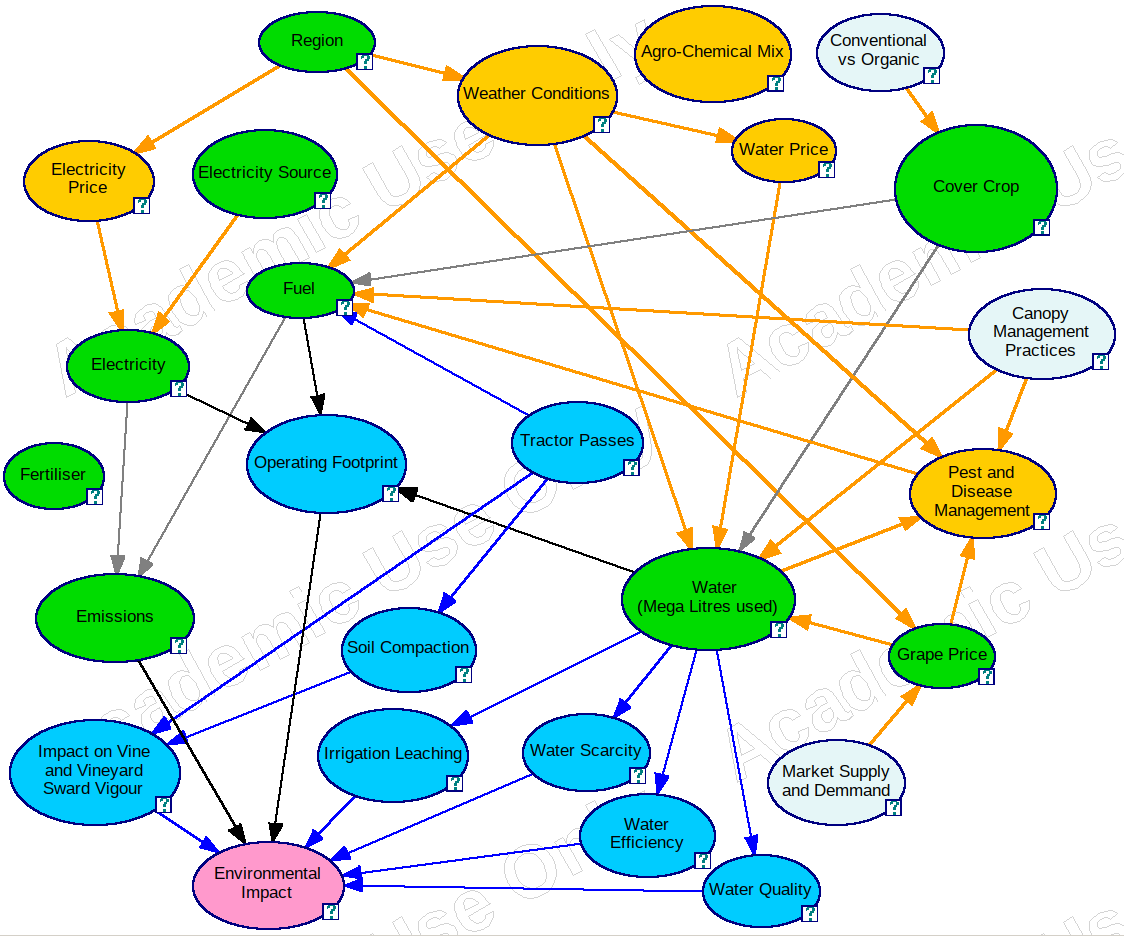
**Table of nodes, connections and data sources**

|  |  |  |
| --- | --- | --- |
| **Node** | **Connected to (impacts on)** | **Data Source** |
| Environmental Impact |  | Expert defined |
| Fertiliser |  | SWA |
| Agro-Chemical Mix |  | Spray Diaries |
| Water Quality | Environmental Impact |  |
| Water Efficiency | Environmental Impact |  |
| Irrigation Leaching | Environmental Impact |  |
| Water Scarcity | Environmental Impact |  |
| Impact on Sward Vigour | Environmental Impact |  |
| Soil Compaction | Impact on Sward Vigour |  |
| Operating Footprint | Environmental Impact |  |
| Emissions | Environmental Impact |  |
| Fuel | Emissions  Operating Footprint | SWA |
| Tractor Passes | Soil Compaction  Impact on Sward Vigour  Fuel | SWA  Spray Diaries |
| Pest and Disease Management | Fuel | Spray Diaries |
| Electricity | Emissions  Operating Footprint | SWA |
| Electricity Source | Electricity | SWA |
| Electricity Price | Electricity | ABS |
| Water (mega litres used) | Water quality  Water efficiency  Irrigation leaching  water scarcity  Operating Footprint  Pest and disease Management | SWA |
| Water price | Water (mega litres used) | ABS |
| Weather conditions | Fuel  Pest and disease management  Water (mega litres used)  Water Price | BOM |
| Canopy management practices | Fuel  Pest and Disease Management  Water (Mega Litres used) |  |
| Grape price | Pest and disease Management  Water (mega litres used) | SWA  Wine Australia |
| Region | Electricity Price  Weather Conditions  Grape Price | SWA |
| Market supply and demand | Grape Price |  |
| Cover crop | Fuel  Water (Mega Litres used) |  |
| Convectional vs organic | Cover Crop |  |

**Summary of current graph structure:**

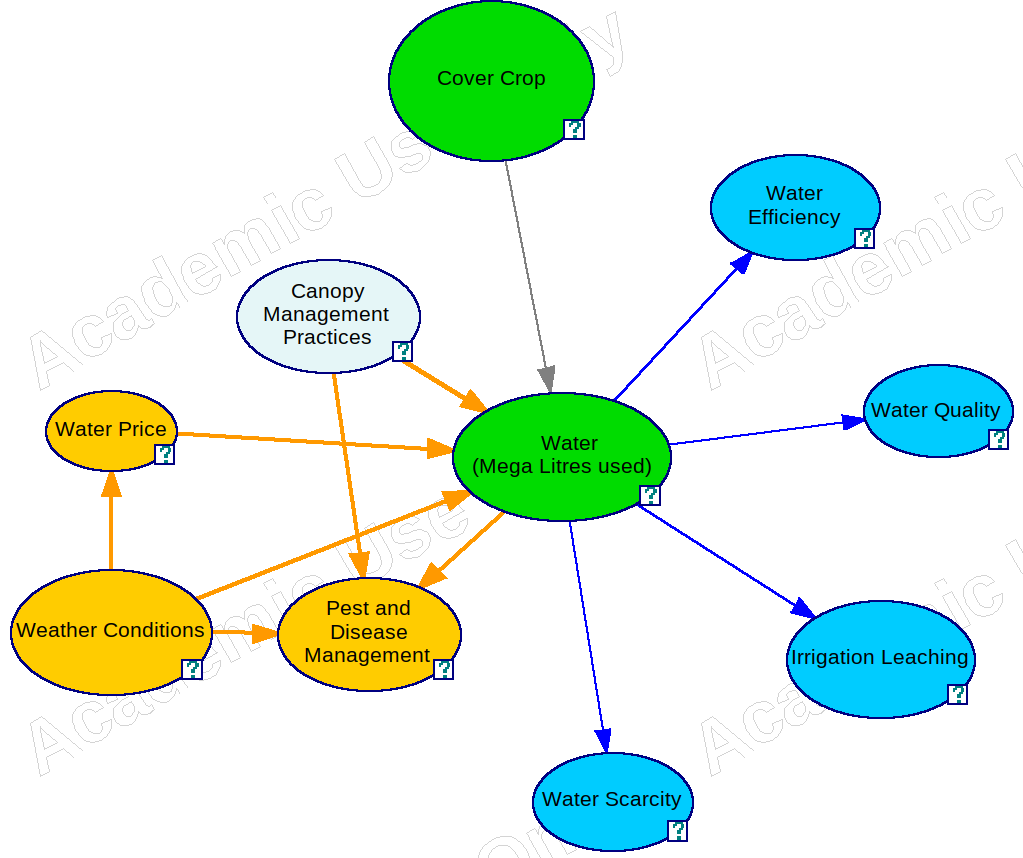
**Colour coding:**

* **Gold** nodes are data that can be acquired but is yet to be incorporated.
* **Green** nodes are well understood data from Sustainable Winegrowing Australia
* **Blue** and **light blue** indicate intermediary nodes and nodes that need more data
* **Gold** arrows are informed connections from the workshop
* **Blue** arrows are tentative connections derived from my notes regarding suggestions.

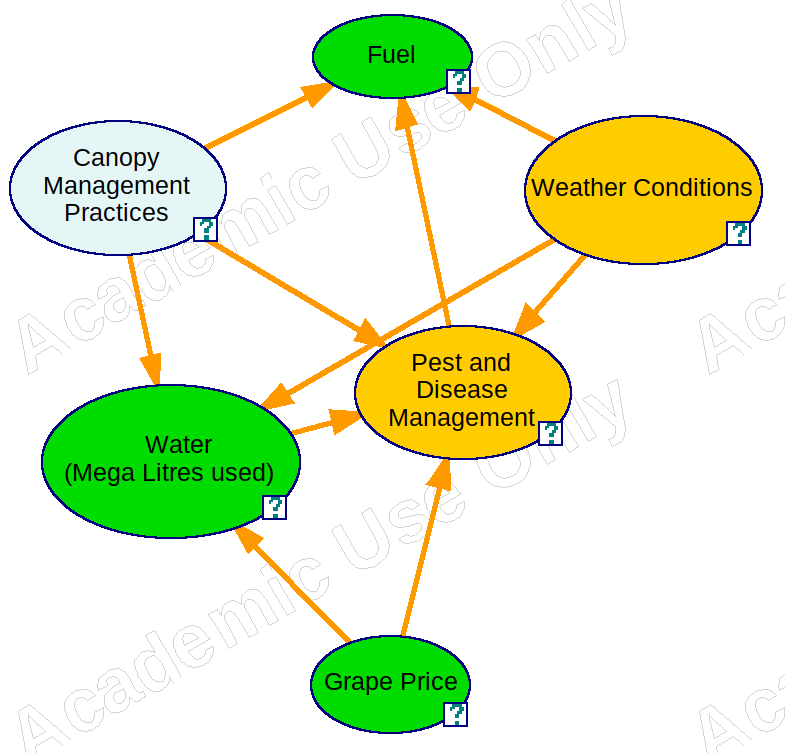


**Summary of nodes connected to Water (Mega litres used)**

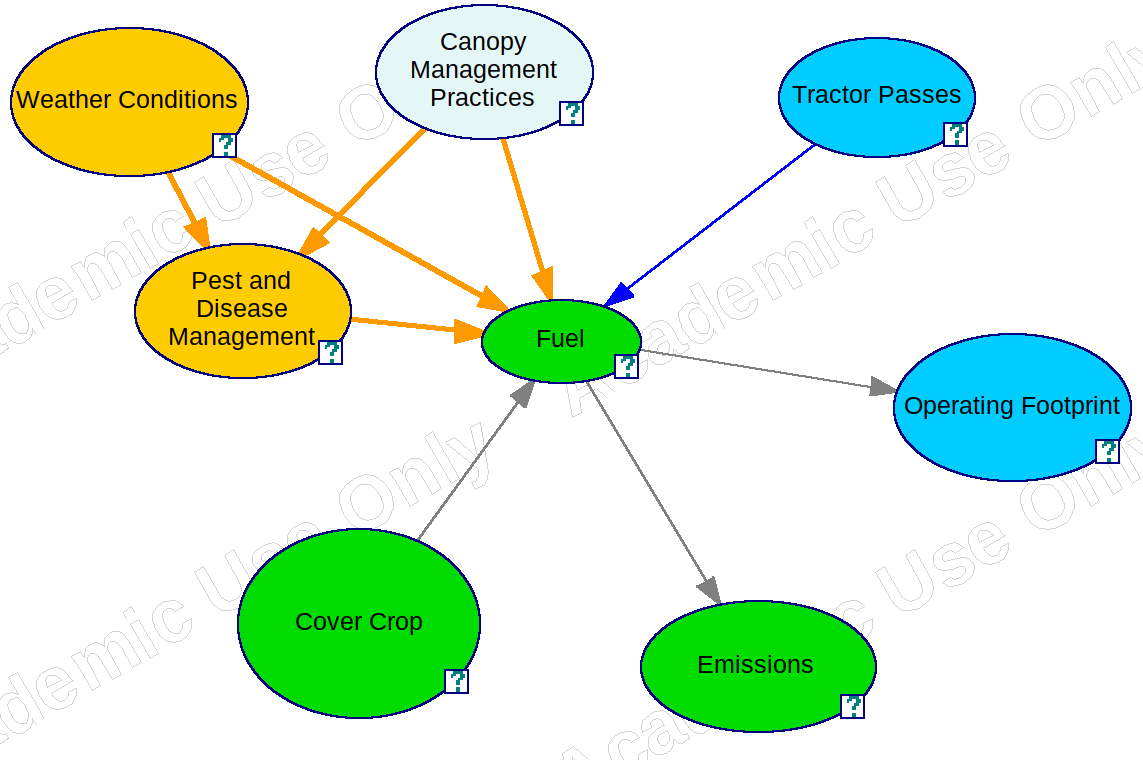
|  |  |
| --- | --- |
| Fertiliser |  |



**Summary of nodes connected to Pest and disease management**



**Summary of nodes connected to Fuel**



**Summary of nodes connected to environmental impact**

