Global Positioning Systems or GPS are used to find the exact location of things. Geographic Information Systems or GIS are used to record information on to maps. Both GPS and GIS are useful in managing land in the high country.

Who has heard of GPS?

GPS Stands for Global Positioning Systems and they are now used throughout the world. A GPS unit is actually a receiver that collects signals from satellites.

Global Positioning System satellites transmit signals to GPS receivers on the ground. Receivers require a clear view of the sky, so they are only used outdoors and do not perform well in forests or near tall buildings.

Each GPS satellite has an atomic clock and sends a signal stating its location and the exact time. All GPS satellites transmit at the same instant. The signals move at the speed of light and arrive at a GPS receiver at slightly different times because some satellites are further away than others. The distance to the GPS satellites can be calculated by estimating the amount of time it takes for their signals to reach the receiver. When the receiver estimates the distance to at least four GPS satellites, it can calculate its position in latitude, longitude and height.

Watch this Youtube video to find out more about how GPS works.

Uses of GPS

GPS has many uses, for example;

- Clock synchronization: The GPS time signals use highly accurate atomic clocks. This technology can be used for things like automatic updates of daylight saving times on cell phones
- Disaster relief and emergency services: Depend upon GPS for location
- Tracking a vehicle, person, pet or aircraft: Receivers provide continuous tracking and can provide an alert if the receiver leaves a set area. Pets can be chipped so they can be found if they become lost
- Geotagging: Applying location coordinates to digital objects such as photographs and other documents for purposes such as creating map overlays.
• Bus tour commentary: your location will determine what information is displayed about approaching points of interest
• Bus stops: to show how long the bus will take to arrive at a bus stop
• Navigation: eg Navman. The device uses voice activation to describe a preferred route based on the position of the receiver, the position of the destination and a street map
• Personal Locator Beacons (PLB): used to inform search and rescue authorities of your exact location in the event of an emergency
• Recreation: For example, geocaching [8] and waymarking [9]
• Surveying: Surveyors [10] use absolute locations to make maps and determine property boundaries
• Tectonics: enables fault motion measurement in earthquakes

How do you think GPS is used in the high country?

What is GIS

Maps have come a long way since people first began drawings to show where they were. Modern maps are created using special software that combines lots of different sorts of information. This system of modern mapping is called GIS – Geographic Information Systems. GIS is used by organisations, such as city councils, that need access to data and need to be able to combine different data sets together. GIS gives people in these organisations graphical representations of data that allows them to:

• analyse situations
• write reports
• track changes
• make decisions
• plan for the future, for example which parts of the high country have undergone tenure review [11]

GIS requires four things:

1. People: people who use GIS are professionals who have been educated to use GIS and have made a career out of working with GIS
2. Data: geospatial information (where things are located) and the details of objects such as services, roads, buildings etc. are collected and entered into the GIS software
3. Software: GIS software analyses data and presents it in different combinations for the user
4. Hardware: includes hand held devices for collecting data and computers with GIS software
Data contained in a GIS system is stored in sets of data called ‘data sets’ in a database. Data sets can be selected, combined and presented as layers:

**Who has heard of GPS?**

GPS stands for Global Positioning Systems and they are now used all over the world. A GPS unit is a receiver that picks up signals from satellites.

Global Positioning System satellites transmit signals to GPS receivers on the ground. Receivers need a clear view of the sky, so they are only used outdoors and do not work well in forests or near tall buildings.

The satellites transmit the exact time the signals are sent. By subtracting the time the signal was transmitted from the time it was received, the GPS can tell how far it is from each satellite. The GPS receiver also knows the exact position in the sky of the satellites, at the moment they sent their signals.

Watch this [YouTube video](#) [6] to find out more about how GPS works.

**Uses of GPS**

GPS has many uses, for example;
• Setting time - automatically updating cell phone times when daylight saving begins and ends
• Disaster relief and emergency services: Depend upon GPS for location
• Tracking a vehicle, person, a pet which has been chipped, or aircraft
• Bus stops: to show how long the bus will take to arrive at a bus stop
• Navigation: for example Navman the device, uses voice activation to describe a route based on the position of the receiver, the position of the destination and a street map
• Personal Locator Beacons (PLB): used to tell search and rescue experts where someone is
• Recreation: eg tramping, climbing, diving, sailing
• Surveying: Surveyors, [10] use GPS locations to make maps and work out property boundaries
• Tectonics: the movement of faults during earthquakes can be measured

How do you think GPS is used in the high country?

What is GIS

Maps have come a long way since people first began drawings to show where they were. Modern maps are made using special software that combines lots of different sorts of information. This system of modern mapping is called GIS – Geographic Information Systems. GIS is used by groups such as city councils, that need access to data and need to be able to combine different data sets together. GIS gives people a picture of data that allows them to:

• problem solve
• write reports
• track changes
• make decisions
• plan for the future eg which areas of the high country have completed tenure review [11]

GIS requires four things:

1. People: people who are trained in GIS
2. Data: geospatial information (where things are located) is entered into the GIS software
3. Software: GIS software analyses data and presents it in different ways for the user
4. Hardware: includes hand held devices for collecting data and computers with GIS software

Data contained in a GIS system is stored in sets of data called ‘data sets’ in a
database. Data sets can be selected, combined and presented as layers:

Māori keywords:

<table>
<thead>
<tr>
<th>pūnaha kimi taunga</th>
<th>Global Positioning System</th>
</tr>
</thead>
<tbody>
<tr>
<td>ao whānui</td>
<td>worldwide, global</td>
</tr>
<tr>
<td>āmiorangi</td>
<td>satellite</td>
</tr>
<tr>
<td>karaka</td>
<td>clock</td>
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<td>whakatere</td>
<td>navigation</td>
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<tr>
<td>pūnaha rorohiko</td>
<td>computer system</td>
</tr>
</tbody>
</table>

Audio Māori keywords:

- **pūnaha kimi taunga - Global Positioning System** [12]
- **ao whānui - worldwide, global** [13]
- **āmiorangi - satellite** [14]
- **karaka - clock** [15]
- **whakatere - navigation** [16]
- **pūnaha rorohiko - computer system** [17]

If you were wanting to develop a piece of land in the high country how would you use GPS and GIS to make this easier?
If you were wanting to develop a piece of land in the high country how would you use GPS and GIS to make this easier?

Nic Donnelly from LINZ shows the GPS equipment used for finding exact locations during surveying work. Image: LEARNZ.

GPS devices are useful for activities such as tramping and climbing where it is important to know where you are. Image: LINZ.
Car navigation systems use GPS to give directions. What are the advantages and disadvantages of using a Car navigation system? Image: LINZ.


Source URL: http://learnz.org.nz/highcountry152/gps-and-gis-technology

Links
[6] https://www.youtube.com/watch?v=0n0T992ccik