**Science as a Human Endeavour (SHE) Question Exemplar for test / exam**

1. *Refer to the following information;*

Signs of illegal fishing include the detonation of bombs being used for mass fish catch, diving activity for protected species, and fishing vessels that are setting fishing gear.

Existing methods include ship tracking systems, fish catch data, and inspections at sea or in port. However, these approaches can be cost-prohibitive, particularly for developing countries. For example, countries such as Indonesia may have nearly a half of a million fishing vessels, so inspecting so many vessels is nearly impossible.

Focusing on users of marine reserves in Australia and fishing with explosives in Indonesia, we are combining robotic camera technology and underwater sound sensors called hydrophones to detect potential illegal activities.

A hydrophone is an underwater listening device used to detect illegal fishing activities. High resolution cameras can capture data on the type of boat, boat features, boat travel speed, idling, and diving. Hydrophones can record sounds from vessel engines, air compressors, winches, or detonation of explosives from tens of kilometres away.

Together with Microsoft, we are developing new cost-effective data processing tools to turn this image and sound data into useable information.

Further development will provide real time alerts directly of officials via satellite or mobile phone communications at very low cost. These alerts will equip authorities with timely information to investigate illegal fishing and support sustainable fisheries management.

Source: Csiro.au. 2020. *Utilising Artificial Intelligence to detect illegal fishing - CSIRO*. [online] Available at: <https://www.csiro.au/en/Research/OandA/Areas/Marine-resources-and-industries/Marine-monitoring-and-surveillance/AI-technologies> [Accessed 26 October 2020].

Discuss two examples of how the extract illustrates one or more of the Science as a Human Endeavour key concepts.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(4 marks)

*Suggested Answer Set*

|  |  |
| --- | --- |
| Signs of illegal fishing include the detonation of bombs being used for mass fish catch, diving activity for protected species, and fishing vessels that are setting fishing gear.  Existing methods include ship tracking systems, fish catch data, and inspections at sea or in port. However, these approaches can be cost-prohibitive, particularly for developing countries. For example, countries such as Indonesia may have nearly a half of a million fishing vessels, so inspecting so many vessels is nearly impossible.  Focusing on users of marine reserves in Australia and fishing with explosives in Indonesia, we are combining robotic camera technology and underwater sound sensors called hydrophones to detect potential illegal activities.  A hydrophone is an underwater listening device used to detect illegal fishing activities. High resolution cameras can capture data on the type of boat, boat features, boat travel speed, idling, and diving. Hydrophones can record sounds from vessel engines, air compressors, winches, or detonation of explosives from tens of kilometres away.  Together with Microsoft, we are developing new cost-effective data processing tools to turn this image and sound data into useable information.  Further development will provide real time alerts directly of officials via satellite or mobile phone communications at very low cost. These alerts will equip authorities with timely information to investigate illegal fishing and support sustainable fisheries management. | *Influence*  *Development*  *Comm and*  *Collaboration*  *Development* |

For 4 marks I would expect at least 2 SHE key concepts identified and explained.

Aim for

* Evidence (from article)
* SHE link
* Impact (importance)

The need for sustainable fisheries management to ensure the protection of fish species and the ability to feed the worlds increasing population has ***influenced*** the CSIRO to research ways to combat illegal fishing.

The CSIRO have worked in conjunction with Microsoft to develop a new technology. Both organisations would need to ***communicate and collaborate*** to ensure the development of the hydrophone that is able to capture data allowing for prosecution, whilst also being able to function at sea. This communication would also be seen in the future development of the technology which will see ‘real time alerts’ sent directly to officials.

The ***development*** of a hydrophone sees two different technologies, a high resolution camera and an underwater listening device, combined. The robotic camera technology allows high resolution images to capture data on boat type and speed, and the underwater listening device to detect sounds from tens of kilometres away. This development will allow for data collection of illegal activity to ensure the capture of illegal fishers. This will allow fisheries in Australia and Indonesia are protected, enhancing sustainable fisheries.