



Technology supported Apiculture: Mobile App & Remote hive monitoring.

RICHARD MATTHIAS, PRESIDENT

IYANOLA APICULTURE COLLECTIVE, ST. LUCIA

DR. KURT PROSPERE,

DR. SHARDA MAHABIR, NC, GEF SGP



Major beekeeping issues

Some of the challenges faced by beekeeper include:

1. **Poor hive management**
2. **Pests and diseases.**
3. **Loss of foraging areas**
4. **Climate change.**
5. **Productivity of the queen.**



<https://www.dadant.com/learn/honey-bee-pests-diseases-common-pests/>



Information Technology in Beekeeping

The most common forms of information technology which address the major issues in beekeeping are:

1. Hive management apps
2. Hive monitors

Information technology (IT) supports hive monitoring by collecting data on the bees during their life cycle, without exposing the bees to additional stress or unproductive activities. The aim of these technical tools is not to replace, but rather to support the beekeeper.

IT is therefore an important tool in terms of hive management, which can support decision making for beekeeping.



Technology supported Beekeeping in the Caribbean

There are very few examples of IT in apiculture in the English speaking Caribbean.

This paper summarises one of the first, if not the first, IT Hive Monitoring data collection exercise for the English speaking Caribbean, specifically St. Lucia.

The main objective of this presentation is to summarise the data collected as well as its successful applicability in hive and apiary management in St. Lucia.



IT data collection



Two types of IT support which were evaluated for this presentation were:

1. Beekeeping app
1. Hive monitors



Hive Keep AR (Early Access)

Leopard Tech Labs Education

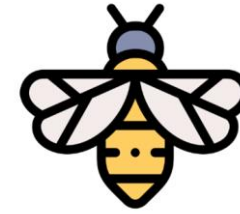
E Everyone

i This app is in development. It may be unstable.

i This app is compatible with your device.



Hive Keep App



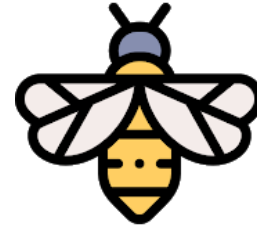
HIVE KEEP AR

1. Hive keep AR - is an app developed by an Indian startup Leopard Tech.
1. The app seeks to better integrate record keeping by beekeepers, capture climatic data, and record the appearance of seasonal forage.
1. Integrate remote technical support and administration management to a pool of beekeepers..

The screenshot shows the 'Detailed Apiary' screen in the Hive Keep App. At the top, there is a yellow header with a back arrow, the title 'Detailed Apiary', and a download icon. Below the header, the 'Apiary ID' is 0018001 and the 'Apiary Location' is Koovappally, Kottayam. There are three main sections: 'Weather Conditions', 'Forage Observed', and 'Hives / Hive Events'. The 'Weather' section is updated on Nov 13, 2020, and shows a sun behind a cloud icon. It lists 'Rain' (marked with a red X), 'Sunny' (marked with a red X), and 'Overcast' (marked with a green checkmark). A 'More' button is present. The 'Forage' section is also updated on Nov 13, 2020, and shows a house icon. It lists 'Tree' (marked with a red X), 'Crop' (marked with a green checkmark), and 'Shrub' (marked with a green checkmark). A 'More' button is present. At the bottom, there is a 'Hives' section with a 'Map view' link.

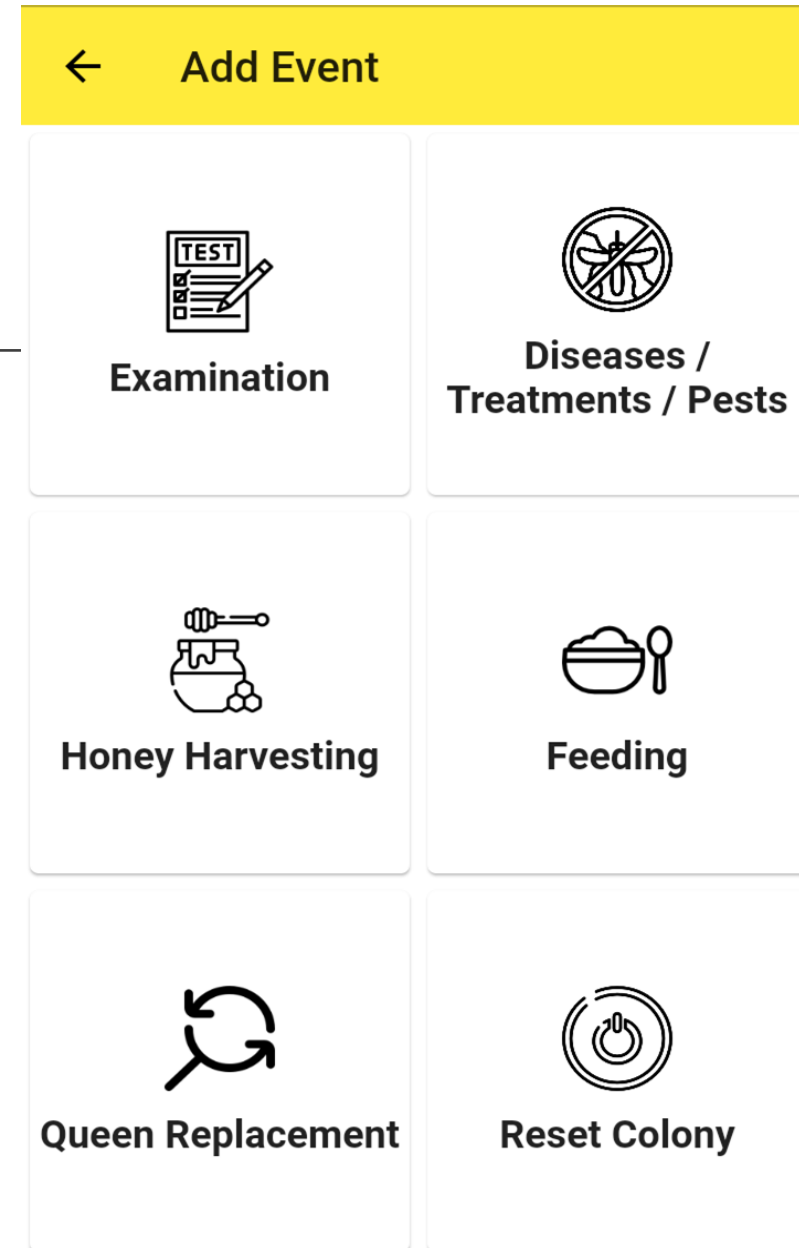


Hive Keep App



The when conducting hive inspections there 6 key components. :

- Examination / Inspection
- Disease treatments & Pests
- Honey harvesting
- Feeding / Nutrition.
- Queen replacement.
- Reset Colony





Hive Keep App

Users are able to capture hive examination data on the app, for reference throughout the year.

This then can be managed and reviewed on the from the admin web interface via the cloud.



← Examination

Box ID

00100208

Type of Examination

Select a type ▼

Hive Active

Stand

Rain Cover

Box Physical

Parasites

Cleaned the Hive

Checked for Queen Cells

← Examination

Checked for Queen Cells

Yes No

Drones Seen

Yes No

Status of Honey in Chamber

Status of honey in chamber ▼

Status of Colony

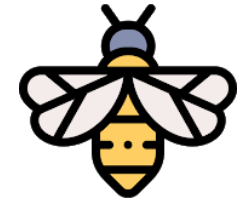
Select colony status ▼

Notes (if any)

Notes



Hive Keep App



Advantages

- Provides beekeepers with a powerful tool to keep detailed records of their hive inspections
- Beekeepers can photograph anomalies, and track them.
- Remote support and review per hive inspections.
- Collect and track terrestrial data.
- Beekeeper is in no way restricted in the way he can manipulate his hive.

Disadvantages

- 100% dependant on the beekeeper imputing accurate data.
- Beekeeper needs to be disciplined in his data collection.

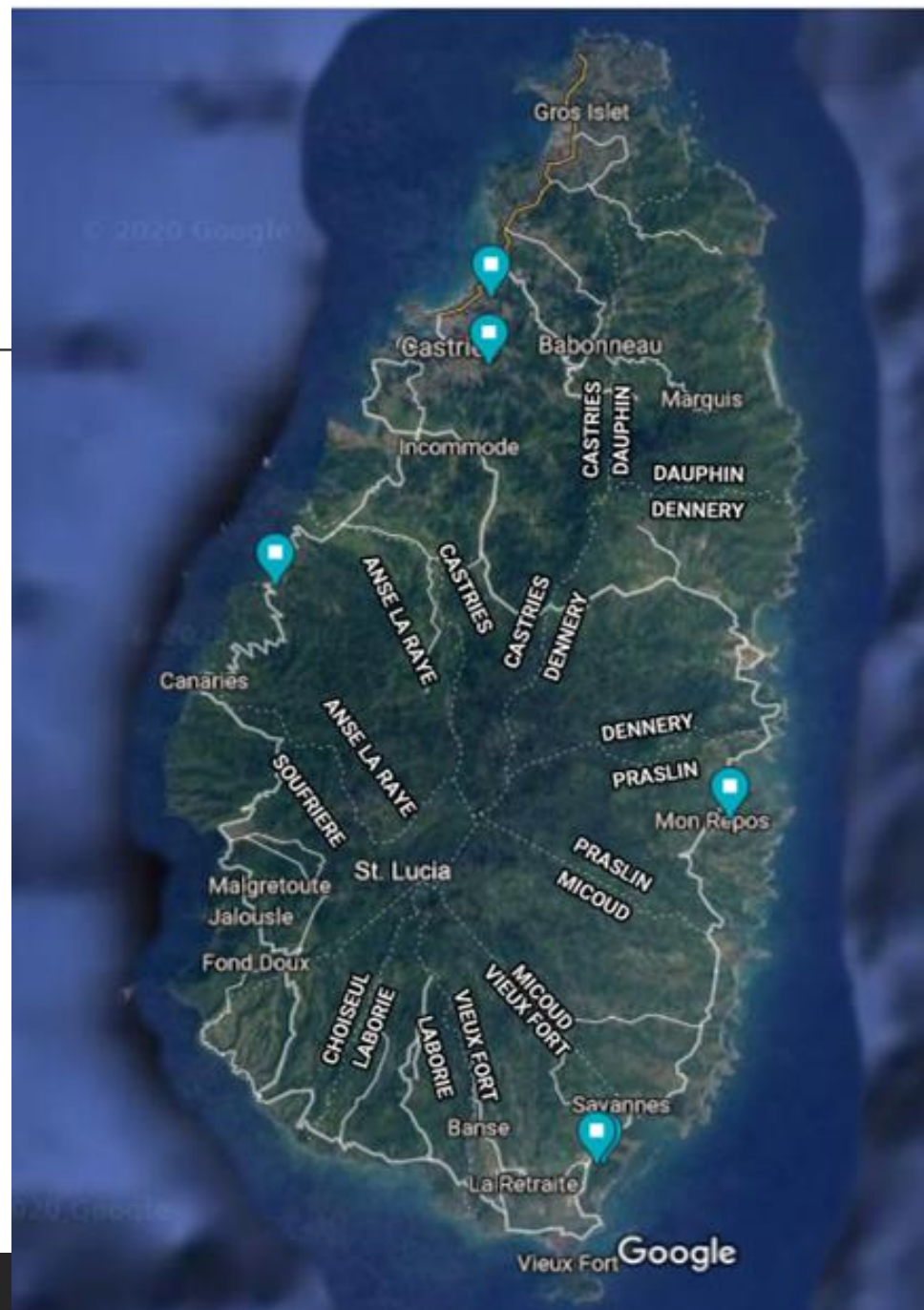


Hive monitors

Hive monitors were purchased from ARNIA, a UK-based company.

Fourty (40) monitors, with four (4) gateways, were deployed in four (4) locations illustrated in the map:

1. North West - 14 monitors
2. East - 5 monitors
3. West - 7 monitors
4. South - 18 monitor





Hive monitors



These hive monitors were able to measure the following characteristics:

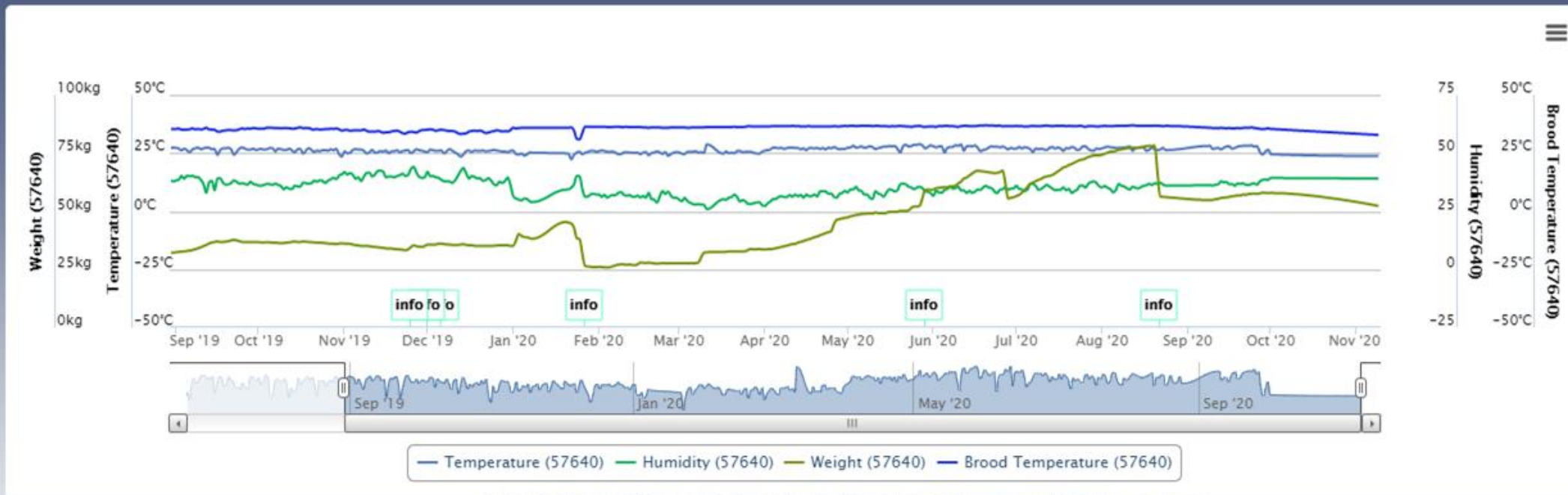
- Hive temperature
- Humidity
- Brood Temperature
- Flight Activity - used to send alerts on hive activity

Data was collected every hour for one (1) year.





Hive monitor data



GATEWAY 2 (5764)

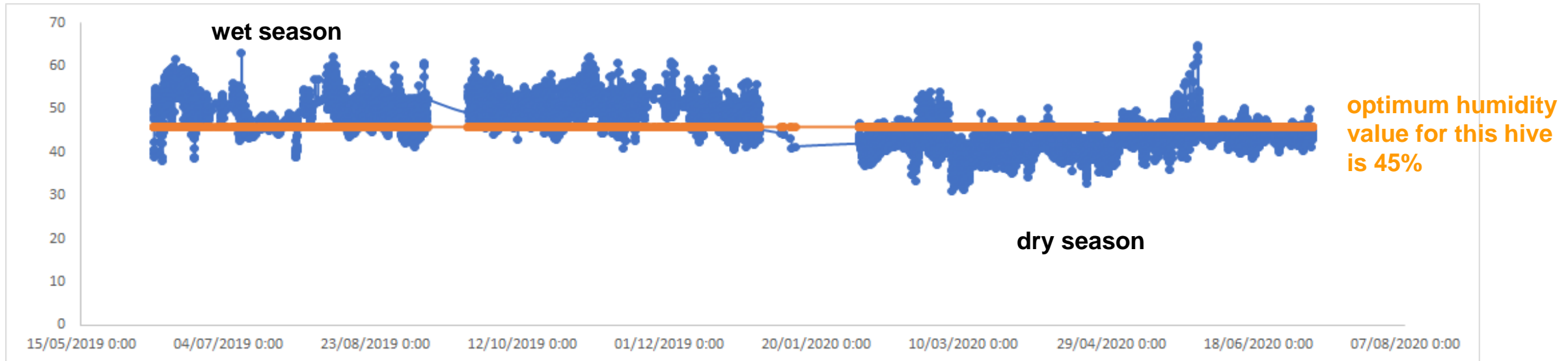
GATEWAY 1 (5761)



Hive monitor data



1. There is a difference in hive temperature and humidity with seasons





Hive monitor data



-
1. Brood temperature ranges between 32.8-36.3°C; optimum value: 34.5°C
 - a. These values are similar to those found in other regions of the world (32.8°C-36.1°C) (Arnia 2017; Bordier et. al. 2017)

 1. Humidity values ranges between 40%-65%; optimum value: 45%
 - a. Hive humidity is rarely found to be below 40% and above 80%. (Arnia 2020)



Hive monitors



Advantages

- Provides continuous Hive and environmental data.
- Sends alerts when there are variations in set values.
- Data can be used to assess the impact of climate change on bee activities
- Enables beekeeper to observe daily weight gain, during periods of honey production

Disadvantages

- Cost of batteries prohibitive
- Monitors are labour intensive
- Minimal hive manipulation on hives equipped with monitors.



Hive Monitors: Lessons Learnt

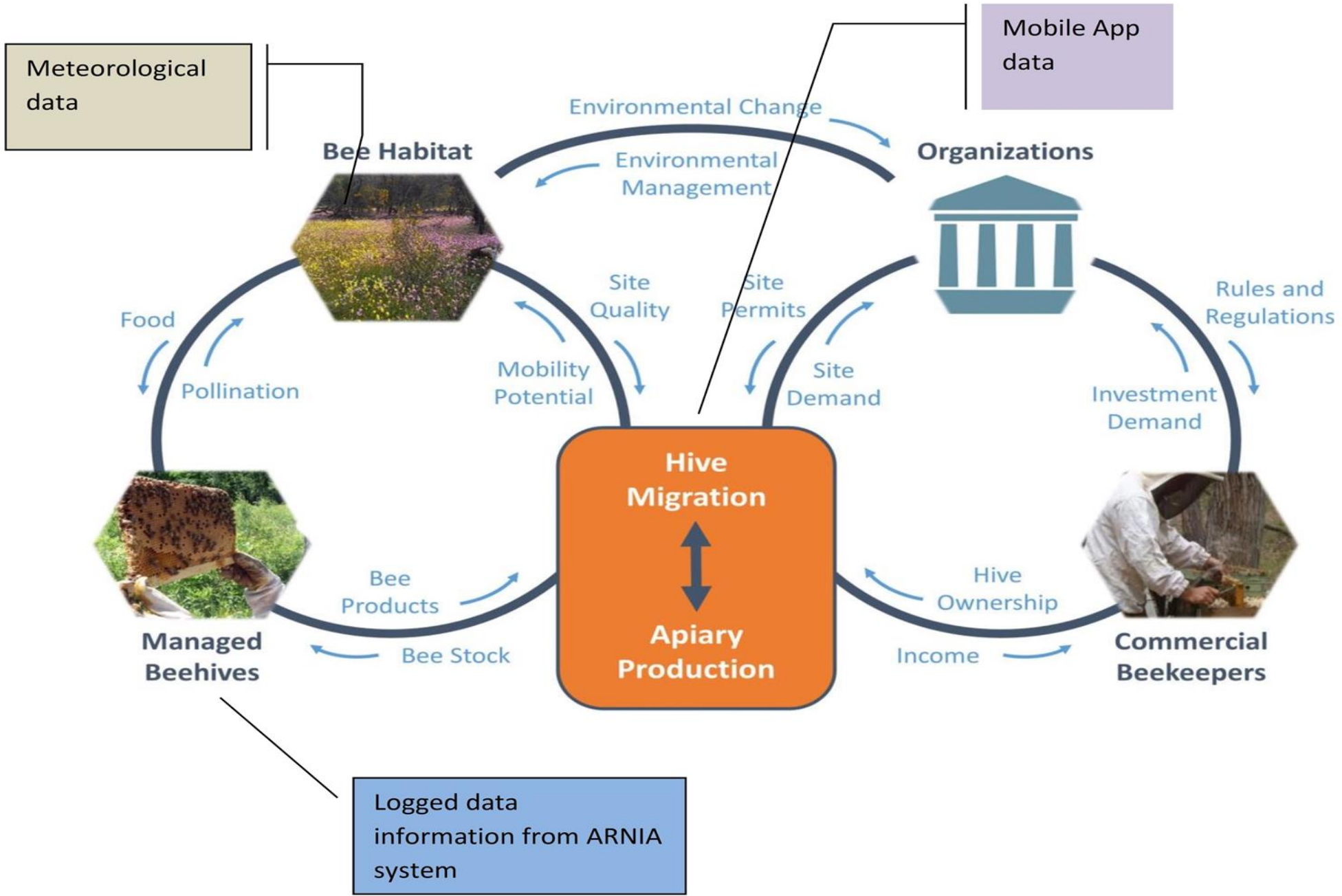
1. It may not be necessary to install more than 4 monitors per site.
2. It is important to check the monitors and download the data every month, even if there are no alerts.
3. The connectivity between server and gateways are at times intermittent.
4. Cost of monitors and batteries is prohibitive.
5. Rain gauge does not provide reliable data.
6. There is a need to have a secondary environmental data source for validation of monitor data.
7. Additional notes and ancillary data required.



Hive Monitors: Lessons Learnt

Potential Uses

1. **Poor hive management** - the monitors provide regular data and alerts which allows for improved hive management.
2. **Pests and diseases** - these will thrive at certain environmental values. The monitors provide data which allows for better management of environmental triggers which can cultivate pests and diseases.
3. **Loss of foraging areas** - The acoustics from the hive will give you an idea, as to how active a colony. If data appears weak, beekeeper can initiate corrective action.
4. **Climate change** - The combination of terrestrial / hive data will give the beekeeper intuitive data that he can respond to.
5. **Productivity of the queen** - Consistent brood temperature above 32°C is one of the best indicators of a healthy and productive queen..





Conclusions

1. Integrating technology into your apiaries does not mean less work, it may actually mean more efficient work to benefit the bees and the beekeeper
1. IT directly addresses the major issues of beekeepers, thereby helping the beekeeper to improve productivity
1. Monitors and app should work together in tandem for greatest success

Thank you!
