

**Teaching and learning resource package: Using the Carbon Calculator Application (Adva) as a pedagogical tool to promote pro-environmental action**

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| Description of Curriculum Resource | The Carbon Calculator App Adva aims to raise environmental awareness and to incite individual action for transformative social change.  To complement this app, the following resources have been developed for educators’ use:   1. PowerPoint slides on how to use Adva (Appendix 1): Educators could use this resource to teach students how to use Adva in class 2. Summary of Adva’s affordances and recommended class activities (Appendix 2): Educators can use this resource to identify the affordances of Adva to better utilise the app while identifying its limits in order to plug learning gaps. |
| Target Audience | Upper secondary students studying Weather and Climate / Climate Cluster of the following Geography syllabuses: 2236, 2272/02, 2246, 2175/02, 2023 USG syllabus  Lower secondary students studying Housing and Transport in Geography.  Students who are learning about the effects of Climate change.  Students who are engaging in Values in Action projects on Climate change. |
| Relevant Big Idea(s) | Everyone has a part to play in the journey towards living more sustainably.  Individuals must believe that their actions in this journey are constructive and impactful. |
| Concepts | Environmental sustainability, environmental stewardship, consumption patterns, trade-offs |
| Lesson Objectives | 1. Students will understand that their present lifestyles may impose a large carbon footprint on the environment that we live in. 2. Students will understand that they can play a part in reducing their carbon footprint by changing their lifestyle. |
| Success Criteria | 1. Students will be able to explain at least one impact their present lifestyle has on the environment. 2. Students will be able to describe at least one way to reduce their carbon footprint on the environment. 3. Students will be able to explain why it is important for them to take action. |
| Lesson Outline | **Trigger Activity / Pre-Activity / Introduction:**  Teacher can play a short video which explains why Singapore is heating up faster than the rest of the world. This video serves to spark curiosity on the predicted consequences of climate change. Teachers can pose the inquiry question “What can be done to reduce Singapore’s carbon footprint and who should be responsible for it?” for discussion. Teachers can summarise key take-aways from the video by establishing that everyone has a role to play in reducing Singapore’s carbon footprint. Teachers can then move on to the next segment of the lesson plan where students get to calculate their carbon footprint via the app as well as explore different ways in which they can reduce their carbon footprint.  Video link: Why is Singapore Heating Up 2X Faster Than The Planet?  https://www.youtube.com/watch?v=UrQ9zjvmD6k&ab\_channel=CNAInsider  **Main Activities:**  **Analysing the factors contributing to one’s carbon footprint**  Teachers can use the slides in Appendix 1 to get students to download the Adva app and complete the lifestyle survey in the app. Students can discuss and analyse their current lifestyles in groups. They can also predict what might happen in the future if they were to continue with their current lifestyle practices.  Some guiding questions teachers can use include:   1. What are the factors contributing to your carbon footprint? 2. What do you think will happen in the next 10 years if your lifestyle does not change? 3. What changes can you make to your existing lifestyle in order to lower your carbon footprint? 4. Why do you think such changes to your lifestyle are important?   Teachers can also highlight that an individual’s ideal carbon footprint (according to Adva) is 2 tons of CO2 per annum.  When teaching the topics on housing and transport, lower secondary geography teachers can capitalise on the lifestyle survey in Adva to get students to identify how their lifestyles (i.e. household and commuting habits) could have had a large carbon footprint.  Upper secondary geography teachers can utilise the lifestyle survey in Adva to highlight how urbanisation (deforestation, the burning of fossil fuels for energy etc.) have contributed to a large carbon footprint on both an individual and urban scale.  **Strategies to reduce one’s carbon footprint**  After attending to the factors influencing one’s carbon footprint, teachers can pose the next inquiry question for discussion. Teachers can direct the class to the curated tasks recommended by Adva.  Teachers can divide students into groups and get each group to select a specific task. Groups can discuss the following question: “How does this task/activity reduce your carbon footprint and what other positive effects can it have on the environment?” Teachers can point out the synoptic links between some recommended tasks by Adva (e.g. eating less red meat, walking/cycling to destinations) and other topics in the geography syllabus (e.g. geographies of food, geographies of health). For instance, plant-based diets are more environmentally friendly because crops require lesser resources (e.g. water) compared to the rearing of livestock (e.g. water and feed).  Upper secondary geography teachers can direct their students to the carbon offset tab in the app. Some of the strategies for offsetting one’s carbon footprint can be understood in light of market-based climate change mitigation efforts on a macro scale (e.g. carbon markets, buying and selling of carbon credits). Students can also be encouraged to scale up sustainable best practices (i.e. with a lower carbon footprint, e.g. school wide initiatives).  **Consolidation/Post-Activity:**  To end the lesson, teachers can prompt the class to reflect on (a) the feasibility and (b) pertinence of making (inconvenient) lifestyle adjustments so as to reduce their carbon/ecological footprint on the environment (e.g. during an exit poll). Teachers can remind students that they are important stakeholders in the journey towards a more sustainable future and that their individual actions, even if seemingly small, can make a collective difference.    For homework, teachers can get students to write a reflection on the difficulties that are associated with pursuing a more sustainable, carbon-light lifestyle and ways of overcoming these difficulties. |

Appendix 1: Power point slides on how to use Adva

Appendix 2: The affordances and limitations of Adva

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| **Affordances** | **Recommendations** |
| The potential environmental benefits of Adva’s recommended tasks are clearly stated. | Teachers can get students to infer how some activities can have an indirect positive effect on the environment. The purchase of an upcycled leash for example may emit lesser carbon dioxide compared to a new one (because incineration releases carbon dioxide into the atmosphere). |
| Adva provides a breakdown of one’s carbon footprint into distinct categories. | Teachers can get students to identify the largest contributor of one’s carbon footprint. Teachers can then get students recalibrate their lifestyle choices accordingly. |
| Adva provides quantifiable data on one’s carbon footprint. | Teachers can get students to identify the tasks which have the greatest ‘savings’ in terms of carbon emissions. Teachers can use this data to highlight that individual lifestyle choices matter (even as they are overshadowed by larger political-economic/systemic/institutional forces), and that collective efforts can have a substantial impact on the environment. |
| Adva provides examples of carbon-offsetting projects. | Teachers can ride on these examples to educate students on a range of climate change mitigation strategies (e.g. investing in the conservation of forests, which are carbon sinks). |
| Adva provides clear examples of how one can pursue a more sustainable lifestyle. | Teachers can get students to identify examples of sustainable tasks/practices by referring to Adva. Teachers can also assign the completion of these tasks as homework to enhance learning by doing. |
| Adva’s “My Planet” feature provides an incentive for students to engage in sustainable practices in order to fill up the silhouettes in “My Planet”. | Teachers can encourage students to complete as many Adva activities as possible. The completion of such tasks can also help students to earn eco-points which can then be exchanged for vouchers or environmentally friendly products. This provides an incentive for students to utilise Adva outside of curriculum time. |
| **Limitations** | **Recommendations** |
| Some of Adva’s recommended tasks require the purchase of sustainable/environmentally-friendly products via the app. | Teachers can direct students to tasks that do not require the purchase of items. Alternatively, students can introduce Adva to their parents who may wish to purchase some of these eco-friendly products for household use. |
| Students may be mislead by the “My Planet” feature. | As the silhouette of an animal is filled up when a task is completed, students may falsely correlate their actions to the thriving of a particular animal species. Teachers may therefore need to inform their students that while conserving the environment can have a positive impact on biodiversity, their actions may not have a direct influence on specific animals. |
| The items available for redemption as ‘rewards’ for accomplishing recommended sustainable tasks may vary. | Teachers can still mobilise Adva to teach students about examples of sustainable behaviour and its impacts on the environment. Teachers can encourage intrinsic motivation based on the lesson outcomes. |
| There is no way to verify if users have indeed completed Adva’s recommended tasks. | Teachers can get students to take a picture of themselves while performing these tasks recommended by Adva. Teachers can rely on platforms like Padlet for the class to share their digital photographs with short descriptions. |