

## Citizen participation as a key enabler for successful public education policies in climate change mitigation in Singapore

Andy Wi

To cite this article: Andy Wi (2018): Citizen participation as a key enabler for successful public education policies in climate change mitigation in Singapore, International Research in Geographical and Environmental Education, DOI: [10.1080/10382046.2018.1430789](https://doi.org/10.1080/10382046.2018.1430789)

To link to this article: <https://doi.org/10.1080/10382046.2018.1430789>



Published online: 02 Feb 2018.



Submit your article to this journal [↗](#)



Article views: 36



View related articles [↗](#)



View Crossmark data [↗](#)



# Citizen participation as a key enabler for successful public education policies in climate change mitigation in Singapore

Andy Wi 

Office of Graduate Studies and Professional Learning, National Institute of Education, Nanyang Technological University, Singapore

## ABSTRACT

A good climate change education policy should focus not only on education but encourage the participation of both the citizens and the government. The author interviewed policy makers, grassroots leaders and the citizens and found that this interaction between the government (top-down) and the citizens (bottom-up) is sorely missing, which results in a disjoint between what the government wants citizens to know and what the citizens actually know. Without this interaction, climate change education policy will not be successful. The proposed Grassroots Approach (GRA) framework that emerged from the qualitative inquiry describes how climate change education policy can be implemented in the context of societies like Singapore through an integration of the top-down and bottom-up approaches. The 6 stages of the GRA enable policy to be formulated, to provide information to the public, to obtain consultation, to encourage involvement, to garner feedback and to seek advisory, with regards to climate change. The findings not only show an update in its current policy but also an indication of the adoption of GRA in implementing new campaigns and initiatives.

## KEYWORDS

Grassroots organisations; top-down approach; bottom-up approach; climate change education policy; climate change; Singapore

## Introduction

Climate change is a global and collective problem and requires a collective solution in which responsible civic participation by individuals, communities and governments is necessary (Stoltman & Lidstone, 2001). While many citizens recognise climate change as a very serious problem, the issue was neither among their top concerns nor of personal relevance (Adger et al., 2009; Leiserowitz, 2005; Patchen, 2006). Climate change was always seen as an “others” problem and thus, does not affect their personal way of life. Citizens fail to link climate-related events to extreme weather phenomenon (Whitmarsh, Lorenzoni, & O'Neill, 2012). The goal of the Environmental Education is to equip citizens with the knowledge, skills and attitude to work individually and collectively in taking action for climate change (UNESCO, 1975). Therefore, a climate change education policy

should focus not only on education but encourage the participation of the citizens and the government.

There are two prominent citizen participation models; Arnstein's (1969) ladder of participation and Connor's (1988) new ladder of citizen participation. Arnstein criticised the limited extent of local control in the US urban development programme (Arnstein, 1969). She believed that there should be citizen participation in all governmental planning processes and citizens could be empowered to participate in the development process (Cornwall, 2008). Whereas Connor's new ladder reflects the progression from one level to another to prevent and resolve public issues (Bruns, 2003; Connor, 1988). He argued that while some governments engage citizen participation actively, they did not hand over the decision making power to the citizens. The key question is "how do we empower citizens to take action for climate change?"

### **Citizen participation and grassroots organisations in Singapore**

The concept of "grassroots" is premised on the basic building blocks of society (Batliwala, 2002) and is often at the local level or community (Dempsey, 2009; Eade, 2000). The main function is to help individuals engage in community intervention and activities with the mission of instrumenting local and societal change for the collective interest of the community (de Souza, 2007; Fisher, 1998; Rothman, 1996). In the Singapore context, the grassroots bodies present in Housing and Development Board (HDB) estates (which are public housing towns) island-wide are well placed to provide community support and help citizens understand government policies (Mokhtar, 2014).

In recent years, actions from the Grassroots Organisations (GROs) have shown promising results in terms of raising awareness and encouraging community involvement, explaining government policies and gathering feedback (Christens, 2010; People's Association [PA], 2011; Paul & Tan, 2003; Smith, 2000). The reason is that they are closer to the community and would be in a better position to address the feasibility and implementation of the programmes as they understand the local context better (Ghai & Vivian, 2014; Mauzy & Milne, 2002). Working together with the GROs, citizens are not seen as individuals but as a collective entity that can bring local knowledge to inform policy making and planning at the national (Christens, 2010) and international levels (Batliwala, 2002).

While the articles in the literature have increasingly talked about the capacity for grassroots to influence public policy at both the local and international levels, any reported success in Singapore can be attributed to its small land area and ease of implementation. Singapore is able to have a decentralised form of local government that looks after the citizens' interest in a very small precinct of no more than 2000 households. However, it may be difficult in a spatial context for a country with regions, provinces, states or districts where there could be social, cultural, economic, and demographic differences.

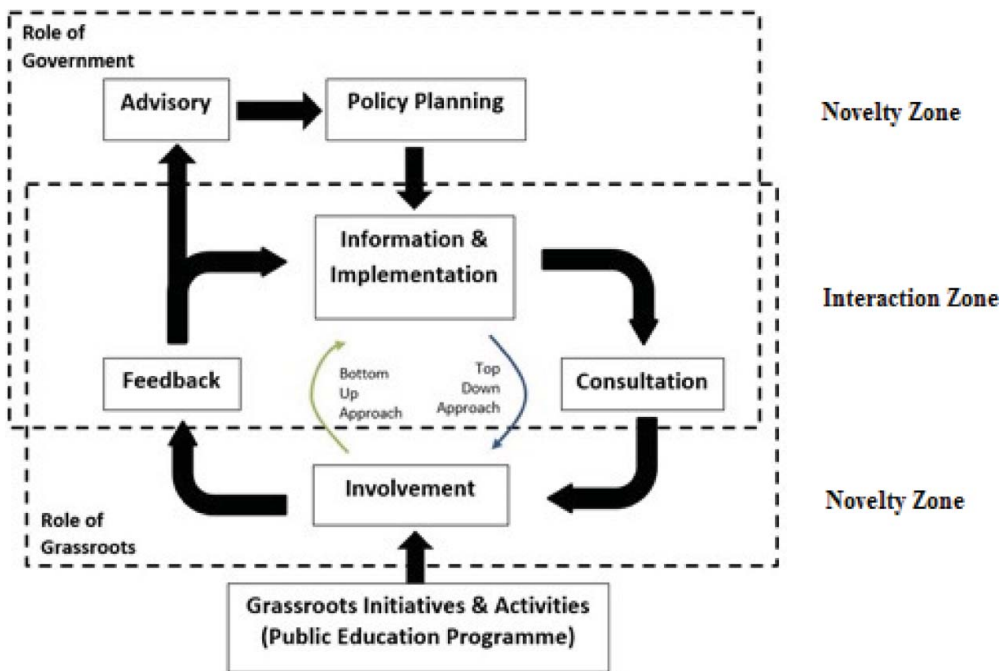
While citizens take action, they also take hints on what the government wants them to do. In other instances, like climate change education, the government decides what to do based on who and where they govern. This article describes the way in which the state exercise control over, or governs and is directly related to how citizen act in society.

Citizenship has a broad meaning, which can range from personal identity, social status (community participation), and national obligations such as military service and political participation (Porter, 1981; Torney-Purta, Lehmann, Oswald, & Schulz, 2001).

### The grassroots approach (GRA) framework to climate change education

Besides the government, geography education also plays an important role in developing citizens to practice and to care for the environment (Kwan, 2003; Van der Schee, 2003). The proposed Grassroots Approach (GRA) conceptual framework for the inquiry on “how do we empower citizens to take action for climate change?”, was therefore adapted from Arnstein’s (1969) ladder of participation, Connor’s (1988) new ladder of citizen participation together with the processes put in place by Singapore’s government and GROs.

The GRA is an overview of the interaction between the government and the citizens, through a more concerted voice of the citizens via the grassroots platform. It considers citizens’ participation in climate conscious behaviour that helps combat climate change, which traverses between the novelty and action zones (as indicated on the right hand side of the diagram in Figure 1). This movement up and down the novelty-action nexus occurs within the integrated cycle of activities that are driven either by top-down or bottom-up approaches in implementing climate change education strategies (as indicated by the circular arrows at the core of the circle in Figure 1). The various stages of the integrated approach are activities that are described in the box, with the processes of these activities illustrated by the arrows.



**Figure 1.** The conceptual framework for grassroots approach (GRA).

The successful implementations of these activities are in turn driven by the motivation of an individual to take part in these activities.

The GRA consists of 6 stages (see [Figure 1](#)) namely; policy planning, information and implementation, public consultations, involvement, feedback and advisory. The stages of GRA enable policy to be formulated, to keep the public informed, to obtain consultation, to encourage involvement, to garner feedback and to seek advisory with regard to climate change.

The policy planning stage is where policy is discussed and decided at the governmental level, at least until the last few years, and there is usually no interaction with the citizens. When the decision is almost finalised, the government begins to implement it in the country.

The implementation stage is very crucial to the social environment as it can create both positive and negative motivation (e.g. rewards and punishments) to behavioural change (Deci & Ryan, 1985).

The consultation stage is a platform that allows the government to consult the citizens for an evaluation of their policy implementation. This is usually a government led consultation.

The involvement stage represents the interaction and communication between the grassroots leaders, citizens and the government (Vivian, 1995). Thus, they play an intermediary role to bring governmental policies to the citizens (top-down) and to bring ideas and initiatives of the citizens back to the government (bottom-up). This is also the stage where most public education programmes (e.g. environmental education programme, grassroots initiatives and activities) take place.

The feedback stage provides a fundamental channel generated from the ground, whereby the citizens can voice their concerns to the government.

The information provided by the citizens goes from consultation to feedback and become part of the advisory, which will result in policy planning. This cycle of information flow helps the government to formulate new policy or update existing policy.

## Methodology

The GRA consists of the three main actors/roles: the role of government, the role of the grassroots and the role of the citizens. Therefore, two phases of interviews and one focus group discussion were conducted to capture the information provided by the different groups.

For phase 1, an interview (See [Appendix 1](#)) was conducted with a policy-maker because he is involved in the climate policy formulation process. The aim was to gather information on the formation of Singapore's climate change strategy and how the National Climate Change Secretariat (NCCS) plays a part in advising the government on climate change issues. The focus here is to examine the role of the government.

For phase 2, interviews (See [Appendix 2](#)) were conducted with the 5 grassroots leaders (GRLs), whose role is to raise awareness about community, encourage community involvement, explain government policies and gather feedback (Christens, 2010; Mauzy & Milne, 2002; PA, 2011; Paul & Tan, 2003). The main objective was to understand how information is passed from the government to the citizens, the different feedback channels and what the GROs can do to bridge the gap between the government and the citizens.

Moreover, the GRLs are living and serving in the same estates, and so they are in a better position to understand the situation and demographics of their estate. The interviews here are to examine the role of the grassroots organisations.

For phase 3, a focus group discussion (See [Appendix 3](#)) was conducted with 6 households to uncover their perceptions on how effective the strategies were and what more can be done to encourage more residents to adopt climate conscious behaviour. A focus group discussion will be more effective here because it provides insights into the operation of group/social processes in the articulation of knowledge, encourages open conversation, and facilitates the expression of ideas and experiences. Such interaction offers data on the extent of consensus and diversity among the participants (Morgan, 1996). This phase examines whether there is interaction between the government and the citizens.

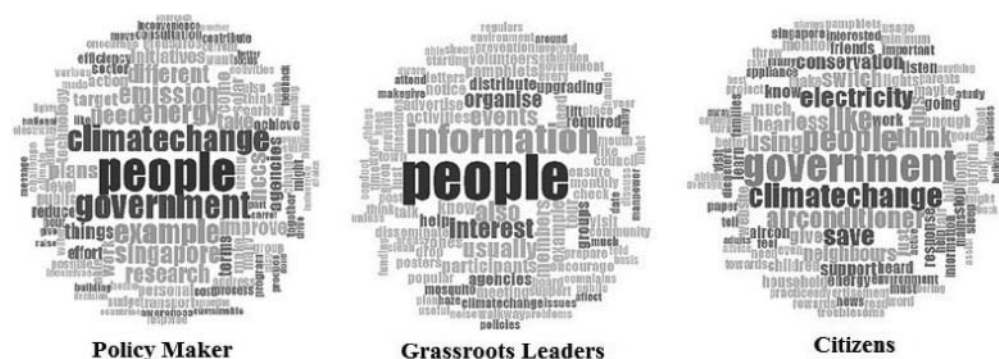
A generalised list of questions (e.g. semi-structured, open-ended questions) was used during both the interviews and the focus group discussion in an attempt to solicit a wide range of comments. The questions pertaining to detailed information were asked while interacting with the respondents. Semi-structured interviews help to define areas to be explored and allow the participants to elaborate and/or provide more detail (Gill, Stewart, Treasure, & Chadwick, 2008). In this way, the interviewee was given the time and opportunity to express views besides those pertaining to the questions posed (Opdenakker, 2006). The interviews were recorded with a tape recorder and later transcribed. Using a tape recorder has the advantage that the interview report is more accurate than writing out notes (Valentine, 1997). In this way, the interviewer is freed from note-taking to concentrate on guiding the interview questions.

The interviews and focus group discussions were first transcribed, and words with similar meaning were clustered together, to form themes. Word count was used to identify patterns, verify the hypothesis and maintain analytic integrity (Leech & Onwuegbuzie, 2011). The themes and codes were counted to assist in understanding the concepts that were predominantly discussed. While the word cloud is a statistic that provides an indication of the number of times each word was used, it is not determinative of the views of the interviewees, but it is indicative of the things in the interviewees' mind.

## Findings

The findings from the interviews showed that interaction between the government and the citizens is sorely missing which results in a disjoint between what the government wants the citizens to know and what the citizens actually know.

Looking at the word cloud for the interviews with the stakeholders in different parts of the GRA, there is a gap between the government and the citizens in terms of who should be the one responsible for climate change (see [Figure 2](#)). The government feels that the biggest players in climate change action should be the citizens while the citizens feel that the government should be the one responsible. This finding supports the key assumption in this study that the top-down approach (government) and the bottom-up approach (citizens) are not communicating. The citizens' word cloud shows the word "government" being the largest implied that the citizens believe in the government's efforts in mitigating climate change. The following sections will describe the findings in each of the groups.



**Figure 2.** Comparison of the participants' responses on the GRA framework via word cloud.

### Policy-maker

*NCCS formulates Singapore's plan to climate change and support the inter-ministerial committee on climate change.*

*While the government had a set of plans, we thought it was useful to also go out to the public, industries and various stakeholder groups to see the response and get feedback.*

From the interview, it was affirmed that the government has made a valiant effort in creating climate change awareness through various campaigns, roadshows and flagship events:

*The key challenge is getting people to be aware that whatever they do can make a difference.*

*We [NCCS] can come out with regulations and programmes but these require people's participation.*

*The main point is that we need such flagship events to raise awareness and signature. If you are just going to promote earth hour by word of mouth, it will take forever to get their message out.*

This is especially evident at the Climate Change Roving Roadshow whereby the National Climate Change Secretariat visited 14 different locations all around the hub of Singapore (NCCS, 2012), to provide information on Singapore's climate change strategies and the importance of individual and community actions to address climate change:

*People are responding to what the government is doing and one good example is Earth Hour. They complement with the work we are doing in terms of raising awareness of climate change and how individual action can contribute to climate-change action.*

*We want people to move towards improving and contributing to improving the environment in their own ways. What we need to do is to reinforce the positive.*

While all these events have created some awareness among the citizens, they are still not taking action for climate change. While the policy-maker did not articulate the importance of information and communication regarding climate change, what seems to tie things together is the category of "citizen participation" and "GROs participation." It is the communication and the flow of information running through the stages that create meaning and engage citizen to take action for climate change.



## GRO leaders

*Meetings are conducted by the town council on a monthly basis and are attended by the town council and the MP and representatives from other government agencies.*

The interview with the grassroots leaders affirmed that information is cascaded down from government agencies to the grassroots who then execute the initiatives and events:

*We will bring the information back to the RC and inform the members. It is to ensure we are able to handle any queries posed by the peoples.*

The grassroots either initiate consultation with the citizens (e.g. weekly Meet the People Session, town-hall meeting) or organise events together with the government agencies:

*The RC do not organise forum or formal discussions. It is usually on an informal basis. We have the town-hall meetings and meet the people session.*

*The RCs are open every day and residents can drop by anytime. They can even email us or check our Facebook.*

Also, the grassroots leaders highlighted 4 communication nodes that the citizens can use to communicate with the government. Firstly, by the location node where a grassroots officer is located near the estate to allow citizens to inquire about issues or give suggestions. Secondly, is the cyber node where all the grassroots of different estates are linked to the “OneService” app and the internet where tech-savvy citizens can access and leave their comments. Thirdly, we have the informal node; the interaction between the grassroots members, volunteers and the citizens (e.g. in the food centres, lifts and common corridors). Although this aspect is limited to the weekends and after office hours during the weekdays, it is especially important as this is the node that creates the community spirit and social bonding. Last but not least, is the social media node where an archive of photos and details of past events are uploaded to Facebook and/or Instagram. This node is mainly an information publicity node for everyone to access and view the grassroots’ past activities and get information on upcoming activities. Besides just photos and information on current and past activities, this node also provides online information on Singapore government’s new policies and initiatives. These nodes are how the GROs used to connect the government and the citizens, therefore, the grassroots is not only aimed at public education (e.g. dissemination facts or explaining policies) but also creates a channel for citizens to provide feedback to the government.

## Citizens

While the grassroots have different communication nodes for the citizens to voice their concerns, the flow of information is mono-directional and incomplete. The interviewed citizens voiced that there is no response from the government after their feedback; to inform the citizens as to what the government is doing. Somehow, the information flowing from the citizen to the government (e.g. consultation stage and feedback stage) is lost as there is no response from the government, which results in many citizens feeling that the government is not listening and doing nothing:

*People will not know unless the government talks about it.*

*Unless information is given (explained) to me, I will not actively seek to understand them.*



While the Singapore government has put in much effort to mitigate and adapt to climate change, the citizens indicated that they are unaware of what the government is doing. Perhaps more could be done to help citizens understand better:

*Last time I never do it because nobody explains to me why or how. They just tell me to do this and that because it is climate friendly.*

*The schools should teach about climate change education.*

*I will try the conservation tips if my neighbours are also trying it.*

It was also mentioned that the information flow was not tailored to the interest of the citizens and many felt the information to be dry, uninformative and did not apply to them. In addition, citizens indicated that they were more willing to try conservation tips if their neighbours were trying it. Since GROs are made up of the citizens/neighbours themselves, they are at a great position to strengthen this interaction between the government and the people:

*If it is very important, the government will inform us in the news, newspapers and radio.*

*The government should tax only those who use more electricity.*

The citizens were very reliant on the government for information and action (as shown in [Figure 2](#)); the word “government” is the most important factor in terms of climate change followed by the “citizen”.

## Discussion

The findings of this study have supported the notion that there is little interaction between the grassroots and the government. For this interaction to occur, there should be an intersection point between the government (top-down) policy and the grassroots (bottom-up) initiatives. In Carvalho's (2007) study, effective climate change education policies would require governments to move from short-term goals to political farsightedness. That is why many countries struggle to implement strategies and policies to adapt to the changing climate while negotiating political commitment at the international level (Chang, 2014). In terms of describing Singapore's climate change education, two possible ways could be the top-down approach (government initiated programmes) and the bottom-up approach (initiatives by the citizen from the ground).

### Top-down approach

Governments have always been implementing and updating policies based on a top-down framework (OECD, 2003), as they believed that is the best method to resolve the climate change phenomenon. In Singapore, this approach is met with the least resistance from the citizens, and it is likely to succeed, as governments can mobilise more resources compared to private organisations.

The top-down approach is an autocratic and hierarchical style of decision making where an executive or a group of executives make a decision (Fraser, Dougill, Mabee, Reed, & McAlpine, 2006). This approach is disseminated under their authority to lower

levels in the hierarchy and is seen most commonly in the military or multinational company. The advantage of the top-down approach is the simplicity and efficiency of making a decision (OECD, 2003). The disadvantage is that it requires specialised knowledge and when there is insufficient clarity in the decision, it would trigger unhappiness and results in low participation rates (Fraser et al., 2006). This is not all bad, because such implementation has shown to be able to create awareness among the citizens (Abrahamse, Steg, Vlek, & Rothengatter, 2007; Chang, 2008).

### ***Bottom-up approach***

On the other hand, a bottom-up approach is a democratic and consultative style of decision making that works from the grassroots upward. This approach motivates the participation of the citizens to work together and promotes creativity and ownership of the joint involvement/project (Fraser et al., 2006). It also leverages on specialised knowledge and experiences contributed by the citizen of different professions. The disadvantage of this approach is the lack of democratic control and confusion of making a group decision.

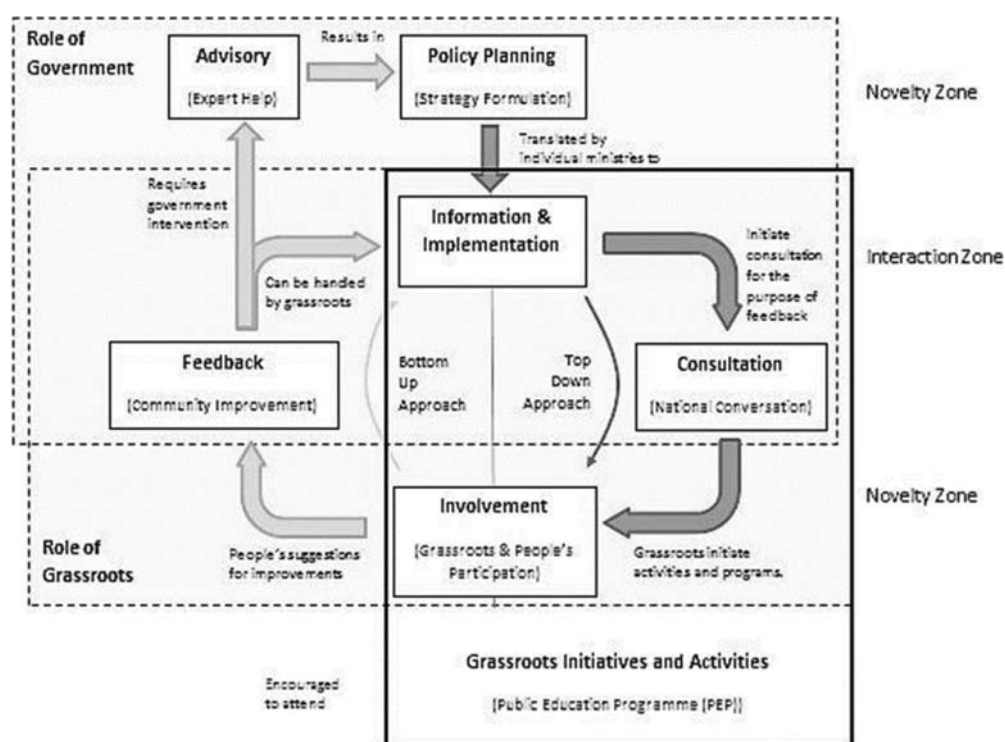
### ***Integrating top-down bottom-up approach***

Climate change involves global problems that require social, technological and political relations to be successful (Räthzel & Uzzell, 2009). Thus, the emphasis on either citizens' responsibility or the government's responsibility is not enough. Our collective future is neither dependent on only a top-down governmental approach nor a bottom-up individual's approach, but on restoring and preserving the quality of the environment by living climate conscious lifestyle that could well be a product of both approaches. Climate change education cannot be done without the collaborative efforts of the government, the community, and the participation of citizens at the local level (Adger, 2003; Ghai & Vivian, 2014). Therefore, a good climate change education policy needs to have interaction between the top-down and bottom-up approach. Without this interaction, climate change education policy will not be successful. Further, a standard framework across countries that describes a concerted grassroots approach grounded in the community is not available.

### ***Operationalising the GRA***

The findings from the interviews have enabled the author to fill in the connectors between the 6 stages of GRA (see Figure 3). However, public education programmes are not limited to the involvement stage only but require the participation of both the government and the GROs. It has to encompass the consultation stage as well as the information stage and involvement stage for it to be able to integrate and link the government, the GROs and the citizens (see Figure 3).

For the GRA to work, it is imperative that the government provides the information during the implementation stage, followed by the consultation stage to consult the citizens for an evaluation of their policy implementation. This will in turn encourage citizens to participate in climate change activities at the involvement stage. Through the feedback stage, information then feeds back to the advisory which aid in the formulation of new policy. The flow can be highly hypothetical, but it is useful to give the reader an idea of



**Figure 3.** The grassroots approach (GRA) to climate change education.

how things flow within the GRA. Therefore, the government has to provide proper directions and support structure through the GROs to encourage citizens to adopt climate conscious behaviour.

However, without the GROs, it is impossible to achieve that, because it becomes just a top-down process and a bottom-up process with nothing in between. Therefore, when citizens take action, it shows that they understand and can provide a more targeted and accurate feedback. Only then can the government officials be able to make sense of the feedback they get. Therefore, the current emphasis on citizens' responsibility without government participation is not effective in encouraging climate conscious behaviour. It cannot be done without the full support of the government, the community, and the participation of citizens at the local level (Ghai & Vivian, 2014).

This shifts from the established convention and ideology of a top-down approach through international agreements being filtered down through a national level government, to society and then to the individual. Instead, it proposes to encourage citizen to assimilate climate conscious behaviour with the integration of top-down (governmental) and bottom-up (citizens) approaches through the support of GROs, bearing in mind that there is no "one-size-fits-all" solution to climate change as different countries have different environments and contexts which require different approaches to climate change education. Moreover, Singapore's different districts would have their own unique limitations and challenges. Singapore is organised locally through districts, which are further divided into different zones that represent different demographics such as age, socio-economic status and landscape density.

### ***Implication of the study***

During the study, the author shared with the Ministry of Environment and Water Resource (MEWR) and the National Environmental Agency (NEA) regarding his research direction, methodology and illustrated how GRA work through the grassroots. While the author cannot confirm that the advisory has reached the government, the following shows that the initiatives and methodology have indeed reached the government. The revision of the Mandatory Energy Labelling Scheme (MELS) and Minimum Energy Performance Standards (MEPS) policies suggest that the government has indeed considered such feedback and launched further research (NEA, 2015a, 2015b; REACH, 2016). In addition, the adoption of the idea in all Community Centres (CCs), a part of the Singapore GROs, is perhaps an indication of how effective the GRA is.

### ***Revisions to the MEPS and MELS policies***

With effect from July 2015, lamps commonly used in households must meet the MEPS and MELS required standards (Channel News Asia, 2015; NEA, 2015a). Under the new rating system for lamps, the highest efficiency level is denoted by three ticks and the lowest by one tick. The change will apply to all incandescent lamps, compact fluorescent lamps and LED lamps. In addition, NEA has also implemented higher energy performance standards for air-conditioners (NEA, 2015b).

### ***Cool CC @ Southwest***

All CCs in the SouthWest adopted climate conscious practices with the launch of this “Cool CC” initiative. Participating CCs received education posters, stickers feathering energy saving tips. These messages were put up at each venue to educate and remind citizens to be climate conscious. The CCs practiced climate conscious behaviour like setting all air-conditioners to 25 °C, installing water thimbles, LED lights and switching off electrical power points when they are not in use (South West CDC, 2015).

### ***Directions for future research***

During the discussion with MEWR and NEA, the directors indicated that they were interested in expanding the study to focus on the public education programme. Specifically in terms of a GRA approach in educating the public, the limitations, and barriers the citizens may face in living climate conscious lifestyles. Therefore, the author will work with MEWR and NEA in the next study to develop a public education programme to support the GRA framework.

### ***Conclusion***

Climate change mitigation remains at the level of education and awareness building, because many economic and especially regulatory instruments, do not work effectively without enforcement and compliance (Barrett & Stavins, 2003; McKibbin & Wicoxen, 2002). Although GROs encourage community involvement and raise awareness about community issues (Florin & Wandersman, 1990; PA, 2011; Pospíšilová, 2011), different areas (e.g. districts, zones) with different demographic patterns require different

initiatives. Consequently, they are not sustainable without the support from the government. Since grassroots intervention with the environment is essential for the formulation of effective policies for sustainable development (Vivian, 1995), an integration of both approaches could provide financial support and knowledge in enhancing the interest and initiatives of the grassroots while encouraging the development of climate conscious behaviour. This can empower citizens to act responsibly and encourage citizen participation on climate change issues (Stoltman & Lidstone, 2001).

For nation-wide climate change mitigation initiatives to succeed, it is important not only to understand the citizens' perspectives, social processes and human-environment interaction (Jordan, Hungerford, & Tomera, 1986) but it is necessary to construct collaborative policies that are effective and efficient (Mitchell & Tanner, 2006; Stern, 2009; Surjan, Takeuchi, & Shaw, 2011). This explains why there is no "magic bullet" in climate change education and that the effectiveness of policies differs from country to country. Moreover, ideas and solutions towards tackling climate change, it should not be left to the aspirations of passionate individuals or a small number of Non-Governmental Organisations (NGOs) who might implement an idea on a short-term and ad-hoc basis (MEWR, 2008).

The Grassroots Approach is a conceptual framework organised around a cycle of activities and processes that promote the interaction and communication between the government, grassroots and the non-governmental organisations. The different stages enable policy-makers and grassroots to insert policies and initiatives at any point and begin implementation. Thus, to operationalise the GRA, the main conduit is the communication and interaction between the government and the locals, as they are in a position to bring information from the government to the citizen and at the same time inform policy formulation at the national level. It is important to caveat that this study provides another avenue in which countries can model their environmental programmes. It is by no means to compare which environmental framework is better, as there is no "one-size-fits-all" solution to climate change as different countries have different environments and contexts which require different approaches to climate change management. The findings not only show an update in its current policy but also an indication of the adoption of GRA in implementing new campaigns and initiatives. Therefore, there is potential for countries with similar social context or similar GROs structure to adapt and implement climate change education policy and initiative within the GRA framework.

## Acknowledgement

The study was done as part of the author's thesis at the National Institute of Education, Nanyang Technological University, Singapore.

## Disclosure statement

No potential conflict of interest was reported by the author.

## ORCID

Andy Wi  <http://orcid.org/0000-0001-6707-7203>

## References

- Abrahamse, W., Steg, L., Vlek, C., & Rothengatter, T. (2007). The effect of tailored information, goal setting, and tailored feedback on household energy use, energy-related behaviors, and behavioral antecedents. *Journal of Environmental Psychology*, 27(4), 265–276.
- Adger, W. N. (2003). Social capital, collective action and adaptation to climate change. *Economic Geography*, 79(4), 387–404.
- Adger, W. N., Dessai, S., Goulden, M., Hulme, M., Lorenzoni, I., Nelson, D. R., ... Wreford, A. (2009). Are there social limits to adaptation to climate change? *Climatic change*, 93(3–4), 335–354.
- Arnstein, S. R. (1969). A ladder of citizen participation. *Journal of the American Institute of planners*, 35(4), 216–224.
- Barrett, S., & Stavins, R. (2003). Increasing participation and compliance in international climate change agreements. *International Environmental Agreements: Politics, Law and Economics*, 3(4), 349–376.
- Batliwala, S. (2002). Grassroots movements as transnational actors: Implications for global civil society. *Voluntas: International Journal of Voluntary and Nonprofit Organizations*, 13(4), 393–409.
- Bruns, B. (2003). *Water tenure reform: Developing an extended ladder of participation*. Chiang Mai: Politics of the Commons: Articulating Development and Strengthening Local Practices.
- Chang, C. H. (2008). *Climate and climate change: A Singapore Perspective*. Singapore: McGraw Hill.
- Chang, C. H. (2014). *Climate change education: Knowing, doing and being*. Routledge: Abingdon, Oxon.
- Channel News Asia. (2015). Lamps to have new energy labels from July. Retrieved from <http://www.channelnewsasia.com/news/singapore/lamps-to-have-new-energy/1949866.html>
- Christens, B. D. (2010). Public relationship building in grassroots community organizing: Relational intervention for individual and systems change. *Journal of Community Psychology*, 38(7), 886–900.
- Connor, D. M. (1988). A new ladder of citizen participation. *National Civic Review*, 77(3), 249–257.
- Cornwall, A. (2008). Unpacking ‘Participation’: Models, meanings and practices. *Community Development Journal*, 43(3), 269–283.
- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behaviour*. New York: Plenum.
- Dempsey, S. E. (2009). NGOs, communicative labor, and the work of grassroots representation. *Communication and Critical/Cultural Studies*, 6(4), 328–345.
- de Souza, R. T. (2007). *NGOs and empowerment: Creating communicative spaces in the realm of HIV/AIDS in India*. (Doctoral dissertation, Purdue University).
- Eade, D. (Ed.). (2000). *Development, NGOs, and Civil Society*. Oxford: Oxfam.
- Fisher, J. (1998). *NGOs and the political development of the third world*. Connecticut: Kumarian Press.
- Florin, P., & Wandersman, A. (1990). An introduction to citizen participation, voluntary organizations, and community development: Insights for empowerment through research. *American Journal of Community Psychology*, 18(1), 41–54.
- Fraser, E. D., Dougill, A. J., Mabee, W. E., Reed, M., & McAlpine, P. (2006). Bottom up and top down: Analysis of participatory processes for sustainability indicator identification as a pathway to community empowerment and sustainable environmental management. *Journal of Environmental Management*, 78(2), 114–127.
- Ghai, D., & Vivian, J. M. (2014). *Grassroots environmental action: People’s participation in sustainable development*. Abingdon, Oxon: Routledge.
- Gill, P., Stewart, K., Treasure, E., & Chadwick, B. (2008). Methods of data collection in qualitative research: Interviews and focus groups. *British dental journal*, 204(6), 291–295.
- Jordan, J. R., Hungerford, H. R., & Tomera, A. N. (1986). Effects of two residential environmental workshops on high school students. *Journal of Environmental Education*, 18(1), 15–22.



- Kwan, T. (2003). Geography and citizenship education in Hong Kong. *International Research in Geographical and Environmental Education*, 12(1), 64–71.
- Leiserowitz, A. A. (2005). American risk perceptions: Is climate change dangerous? *Risk analysis*, 25(6), 1433–1442.
- Leech, N. L., & Onwuegbuzie, A. J. (2011). Beyond constant comparison qualitative data analysis: Using NVivo. *School Psychology Quarterly*, 26(1), 70.
- Mauzy, D. K., & Milne, R. S. (2002). *Singapore politics under the People's Action Party*. London: Routledge.
- McKibbin, W. J., & Wilcoxon, P. J. (2002). The role of economics in climate change policy. *The Journal of Economic Perspectives*, 16(2), 107–129.
- Ministry of Environment and Water Resource. (2008). Singapore's national climate change strategy. Retrieved from [http://app.mewr.gov.sg/data/ImgUpd/NCCS\\_Full\\_Version.pdf](http://app.mewr.gov.sg/data/ImgUpd/NCCS_Full_Version.pdf)
- Mitchell, T., & Tanner, T. (2006). *Adapting to climate change: Challenges and opportunities for the development community*. Brighton: Institute of Development Studies, Tearfund Collaboration.
- Mokhtar, M. (2014). RCs can help link up residents: PM. *The Sunday Times*. Retrieved from <http://ifonlysingaporeans.blogspot.sg/2014/03/rcs-can-help-link-up-residents-pm.html>
- Morgan, D. L. (1996). Focus groups. *Annual Review of Sociology*, 12(1), 129–152.
- National Environmental Agency. (2015a). New mandatory energy label for lamps to help customers make better choices. Retrieved from <http://www.nea.gov.sg/corporate-functions/newsroom/advisories/new-mandatory-energy-label-for-lamps-to-help-consumers-make-better-choices>
- National Environmental Agency. (2015b). Stricter energy performance standards for air-conditioners from September 2016. Retrieved from <http://www.nea.gov.sg/corporate-functions/newsroom/news-releases/year/2015/month/10/stricter-energy-performance-standards-for-air-conditioners-from-september-2016>
- OECD. (2003). *Governance of public research toward better practices: Toward better practices*. France: OECD Publishing.
- Opdenakker, R. (2006). *Advantages and disadvantages of four interview techniques in qualitative research*. In Forum Qualitative Sozialforschung/Forum: Qualitative Social Research.7(4)
- Peoples' Association, Singapore (PA). (2011). About grassroots organisations. Retrieved from <http://www.pa.gov.sg/about-grassroots-organisations.html>
- Patchen, M. (2006). Public attitudes and behaviour about climate change. Purdue Climate Change Research Center Outreach Publication, 601. Retrieved from <http://www.purdue.edu/discovery-park/climate/resources/docs/Patchen%20OP0601.pdf>
- Paul, K., & Tan, A. S.-S. (2003). Democracy and the grassroots sector in Singapore. *Space and Polity*, 7(1), 3–20.
- Porter, A. (1981). Political literacy. In D. Heater & J. A. Gillespie (Eds.), *Political education in flux*. London: Sage. p. 181–211
- Pospíšilová, T. (2011). Grassroots volunteering: definitions, concepts and themes. *Overview of the Literature Praha: Agora*. Praha: Agora. Retrieved from, [http://www.agorace.cz/archive\\_files/Grasroots\\_volunteering.pdf](http://www.agorace.cz/archive_files/Grasroots_volunteering.pdf)
- Rathzel, N., & Uzzell, D. (2009). Changing relations in global environmental change. *Global Environmental Change*, 19(3), 326–335.
- REACH. (2016). Public consultation on raising minimum energy performance standards for refrigerators. Retrieved from <https://www.reach.gov.sg/participate/public-consultation/national-environment-agency/environmental-protection/raising-minimum-energy-performance-standards-for-refrigerators>
- Rothman, J. (1996). The interweaving of community intervention approaches. *Journal of Community Practice*, 3(3–4), 69–99.
- Smith, D. H. (2000). *Grassroots associations*. Newbury Park, CA: Sage Publications.
- South West, C. D. C. (2015). Green Champion. *E-Bridge* (Nov-Dec 2015). Retrieved from <https://cdc.org.sg/SouthWest/Newsroom/E-BRIDGE>
- Stern, N. (2009). A global deal on climate change. In S. Saw & D. Quah (Eds.), *The politics of knowledge* (pp. 111–155). Singapore: Institute of Southeast Asian Studies.



- Stoltman, J. P., & Lidstone, J. (2001). Citizenship education: A necessary perspective for geography and environmental education. *International Research in Geographical and Environmental Education*, 10(3), 215–217.
- Surjan, A., Takeuchi, Y., & Shaw, R. (2011). *From disaster and climate risk to urban resilience: Approaching through community based environment improvement*. Singapore: Research Publishing Service.
- Torney-Purta, J., Lehmann, R., Oswald, H., & Schulz, W. (2001). *Citizenship and education in twenty-eight countries: Civic knowledge and engagement at age fourteen*. Amsterdam: IEA Secretariat.
- UNESCO. (1975). Belgrade charter. Retrieved from <http://unesdoc.unesco.org/images/0001/000177/017772eb.pdf>
- Valentine, G. (1997). Tell me about...: Using interviews as a research methodology. *Methods in Human Geography*, 2, 27–54.
- Van der Schee, J. (2003). Geographical education and citizenship education. *International Research in Geographical and Environmental Education*, 12(1), 49–53.
- Vivian, J. M. (1995). Foundations for sustainable development: Participation, empowerment and local. In D. Ghai and J.M. Vivian (Eds.), *Grassroots environmental action: People's participation in sustainable development*. London: Routledge. p. 50–77.
- Whitmarsh, L., Lorenzoni, I., & O'Neill, S. (2012). *Engaging the public with climate change: Behaviour change and communication*. Abingdon, Oxon: Routledge.
- NCCS (2012). NCCS Climate Change Roving Roadshow. Retrieved 20 Aug, 2015. from <http://cargo.collective.com/senzy/NCCS-s-National-Climate-Change-Roving-Roadshow>.
- Carvalho, A. (2007). Communicating global responsibility? Discourses on climate change and citizenship. *International Journal of Media and Cultural Politics*, 3(2), 180–183.

## Appendices

### Appendix 1. Interview questions for policy-maker

<b>Formation</b>
<b>1. Why was National Climate Change Secretariat formed?</b> <ul style="list-style-type: none"> <li>• Was it based on a consultation process?</li> <li>• Was it influenced by other countries policies?</li> </ul>
<b>2. How were the members/employees of the group selected?</b> <ul style="list-style-type: none"> <li>• Interest?</li> <li>• Academic?</li> <li>• Experiences?</li> </ul>
<b>3. Where is the aims and mission of NCCS?</b> <ul style="list-style-type: none"> <li>• Reduce carbon emission</li> <li>• Develop technological advances</li> <li>• Environmental policy</li> <li>• Awareness and education</li> </ul>
<b>Policies and research</b>
<b>4. From the SG publications, there were many pieces of research done on Singapore's environments? Most of the research was done on the government (top-down level) were there any research done at the GROs or people's level?</b>
<b>5. How did NCCS play a part in formulating Singapore's climate change strategy?</b>
<b>6. During the national conversation (OSC – Our Singapore conversation), was environment concern or renewable energy a topic for discussion?</b>
<b>7. How did NCCS play a part in the formulation of Singapore's climate policy?</b> <ul style="list-style-type: none"> <li>• Advisory (by experience)</li> <li>• Research (before the policy implementation)</li> <li>• Campaign (after policy)</li> <li>• Awareness and education</li> </ul>
<b>8. What are some NCCS's policy target? Are there plans to target beyond the awareness level?</b> <ul style="list-style-type: none"> <li>• Commercial buildings</li> <li>• Private companies</li> <li>• Residential buildings</li> <li>• Citizens</li> </ul>
<b>Measuring success and sustainability</b>
<b>9. There are numerous campaigns and programmes on climate change, how do NCCS measure the success?</b> <ul style="list-style-type: none"> <li>• Policy level</li> <li>• Grassroots level</li> <li>• Businesses/companies level</li> <li>• Citizens level</li> </ul>
<b>10. Are there any plans in place to keep track of existing awareness campaigns, research on people being climate conscious and how successful they are?</b>
<b>11. Singapore is limited renewable potentials, so what is the government's plan for the next 40 years (2050)?</b>
<b>12. There were many private companies embarking on energy efficient process and buildings. What are NCCS's plans to encourage the people to use energy more efficiently?</b>

## Appendix 2. Interview questions for grassroots leaders

Flow of information (top-down/bottom-up)
1. How do the government disseminate information to the public? • How do grassroots get to know of new policies and initiatives?
2. How do the people voice their concerns to the governments? • Feedback • Forum/discussions
3. Were there consultations with other agencies or private companies before organising any initiatives or activities?
Information dissemination guidelines
4. Does the Grassroots decide on how to disseminate the information?
5. Were the materials created by the grassroots or supplied by the government?
6. Are there guidelines on how you can disseminate information?
7. How does the RC support the information dissemination?
Residents information
8. What are the different channels through which residents' can voice their concerns and views to the governments?
9. What information are the residents most receptive to?
10. Are residents active or passive in receiving information about new policies/initiatives from the RCs?
11. Do Grassroots help people understand information better (e.g. consume and transform information into knowledge)? • Any platforms for households to check on their knowledge and understanding regarding climate change.
12. How do Grassroots encourage people to apply their learnt knowledge into practice (in terms of climate change)?
13. How does the Grassroots respond to suggestions and complaints? • If a solution was not acted on, was the reason for it communicated back to the people?

## Appendix 3. Focus group discussion questions for citizens

1. Rate your level of understanding of the following climate change related policies and initiatives to reduce the impacts of climate change. (0– never heard of, 1 – heard of but cannot explain, 2– I can explain) • Mandatory energy labelling scheme (MELS) • Minimum energy performance standards for equipment (MEPS) • Water Efficient labelling scheme (WELS) • 10% Energy challenge • Green vehicle rebate (GVR)
2. How effective are the government's efforts in educating the public on climate change? • Detail level (easy/difficult to understand) • Motivation level (savings) • Information focus (conservation tips/colours/pictures)
3. Who should bear the most responsibility towards climate change? • Individual (residents) • Government • Businesses
4. How do you voice your concerns to the governments? • Feedback/email/Internet/forum/ discussions
5. Have you given any feedback to (or seek assistance from) the government? • How was your experience? • What was their response?
6. Do you think the government is doing enough? What more do you think the government can do? • Support from grassroots/neighbours/friends • Government subsidies and rewards • More advertisement and pamphlets