Online Communities of Practice Empowering Members to Realize Climate-Smart Agriculture in Developing Countries

Maria Nuutinen and Walter Leal Filho

Abstract Communities of practice are networks where individuals share the same interest and the will to learn together on the same domain through regular communication. The Food and Agriculture Organization of the United Nations (FAO) has facilitated and provided online learning opportunities to 12 climate-related communities since 2012. Their objective is to speed up knowledge-sharing, innovation and the uptake of sustainable, climate-smart agricultural practices. Based on members' feedback and online monitoring results, the structured learning events and messages in the communities' online fora (email-based discussion fora, webinar platform and a group on social media) between 12,500 members have helped the members and their colleagues and organizations to solve problems related to climate and food security. To allow development organizations to reply to the needs of practitioners and the challenges that climate change poses to food security and rural development in a timely manner, stakeholder involvement and the "crowd-sourcing" of information is vital. The use of various online fora and platforms, as well as different methods for facilitating communities' exchanges, has revealed several points that educator designing and conducting e-learning could benefit from, allowing for more efficient learning opportunities as a contribution to sustainable transformation of societies. In this chapter, an analysis of the bottlenecks and possibilities of how online communities could benefit a larger group of stakeholders is performed, and the capacity development methods improved for stronger impact are outlined. This chapter also introduces the challenges seen in implementing the concept of online communities of practice, as well as related capacity development methods, outlining technical

M. Nuutinen (✉)
Food and Agriculture Organization of the United Nations—FAO, Viale delle Terme di Caracalla, 00153 Rome, Italy
e-mail: maria.nuutinen@fao.org

W. L. Filho
Research and Transfer Centre, Sustainable Development and Climate Change Management, Hamburg University of Applied Sciences, Ulmenliet 20, D-21033 Hamburg, Germany
e-mail: walter.leal2@haw-hamburg.de

and non-technical components. Finally, the elements that should be considered, for successfully using online fora for more efficient social learning, are listed.

Introduction

Online communities of practice have been expected to contribute to solving challenges related to climate change and the learning challenges that development practitioners, smallholder farmers, herders, fishers and foresters are facing around the globe. The challenge for developing capacity includes not only the need to adapt to the new kinds of changes in the long-term weather patterns, but also the need to reduce greenhouse gas emissions, following the international commitments many countries have signed, to limit climate change.

Communities of Practice (CoPs) have been defined as: "groups of people sharing a concern or a passion for something they do and learn to do it better as they interact regularly" (Wenger 1998). To be able to function, according to Wenger, a community of practice needs: the domain, the members and the practice. In recent years, new concepts, such as 'networks of practice' (Teigland 2003), or 'electronic' or 'virtual network of practice' (see e.g. Wasko et al. 2004) have been proposed, to capture the new forms of communities exchanging on an ever-expanding variety of platforms on the internet. As the term 'network' indicates, these groups can be more "informal, naturally occurring" (Teigland 2003), as well as "geographically separate, but still share work-related practices" (Vaast 2004 in Hildreth and Kimble 2004). As the term 'communities of practice' is still the most used, and as the studied online communities facilitated by the Food and Agriculture Organization of the United Nations (FAO) use this term, the writers use it also in this study.

The number of organizations and individuals willing to start new communities for specific challenges is expanding rapidly (based on a personal observation in e.g. agencies within United Nations, and popular social media fora, such as Facebook, LinkedIn group as well as exchanges with colleagues working on knowledge management) as the benefits of social learning is proved by several organizations, especially in the private sector (Wenger and Snyder 2000; see also: Cambridge et al. 2005). The domains are often complex or require innovation, therefore benefitting from knowledge of different types of experts and combining information from different levels (e.g. field, regions, national, international). As an exchange network of practitioners, communities of practice have potential to speed up access to relevant guidance and information, shared learning, innovation and knowledge exchange on climate-related matters, increase longer-term networking, and improve access to interdisciplinary, collegial support and stronger collaboration for more efficient actions, and finally, sharing best practice across geographical distances

effortlessly. In addition, communities of practice have already played a role in raising creative problem solving and effectiveness of different kind of organizations (see e.g. the examples in Wenger and Snyder 2000). In the FAO communities, the social learning process has shown to enhance understanding and shared definition of key concepts that can support climate change action in different sectors.

However, the activity of many online communities of practice has declined: many have been struggling to function effectively, and to achieve their goals (that in most cases the communities define themselves) for multiple reasons. Several of FAO's 12 online communities of practice created to support practitioners working on different aspects of agriculture sectors (crop, livestock, forestry, fisheries and aquaculture) and climate change have been active and growing ever since the launch of the first one in 2012 and carry on with innovative content sharing and learning (Swennhuis and McCaffrey 2016). Starting with 40 members and one single community, the communities now reach over 12,500 members from over 144 countries (not all members indicate their country); including from a wide range of key organizations in the agriculture, climate and development sector functioning in local, national, regional and global levels as well as main stakeholder groups. The studied communities use three different online platforms: one for emails, second for social media and a third one for webinars and are made visible on FAO web pages as well as partners' sites.

As examples of learning activities, between March 2012 and May 2017 the membership of these communities have benefitted from 17 online learning events, including email-based and structured discussions and over 70 expert presentations on topics ranging from gender and climate-smart agriculture to lifecycle analysis of livestock sector's environmental impact. These presentations have been moderated by FAO's organizing team, and specifically prepared for the learning events. The presentations have been prepared by experts in each topic, both from various development organizations (approximately 40% of them working at FAO), private sector actors, researchers, and some members of the community of practice. Many expert presenters have also became and remained members of the communities after the events. Feedback from members has been very positive and, as a proof of communities' utility, the amount of members leaving communities remains very low (less than 40 persons per year). Based on membership monitoring data, members also keep on participating in learning events and join other sub-communities, indicating also this way their satisfaction with the way the communities function.

The communities' membership grows especially prior, during and after learning events. Also, new members seem to find the community both through FAO's online dissemination and by invitations from other members.

Study Design

The study has been conducted through participatory action research, learning by doing, combining qualitative and quantitative analysis of survey results with the members as well as online learning event discussions. The research data of this study consist of exchanges with 12,500 members within 12 different communities, as well as coaching and training sessions with colleagues wishing to set up communities and/or organize online seminars (or 'webinars'). The data has been gathered through webinars (polls, chats), online surveys and questionnaires, social media, web sites and email (monitoring data e.g. on number of clicks to links), coaching sessions (e.g. through instant messaging applications, such as Skype discussions) and interviews with fellow facilitators and moderators between March 2012 and July 2017. The article is partly based on analysis conducted for a publication *Guidebook for online facilitators. Sharing experiences from climate change and agriculture communities of practice* (FAO 2016), and developed further in this text to cover the distance learning aspects with new data based on new learning events and larger group of community members.

Components of Online Community Learning

The learning process of online communities of practice can be analysed through three main components:

1. Capacity development through online communities
2. Facilitation components
3. Technical components

To conclude, writers would like to suggest some elements for further development in order to reinforce the learning results and the overall impact of online communities of practice.

Capacity Development Through Online Communities

Figure 1 shows the factual process how a member of the FAO-facilitated climate communities can take part in a learning event, if he/she chooses to do so. The actual event usually lasts a bit over two weeks, and consists of one to two webinars and facilitated email-discussion with structuring questions. The objective of the questions is to drive the email-based discussion toward conclusions and entice members to take practical action in their day-to-day work. Figure 2 showcases feedback collected from members in regards their preferred means of exchanging prior to a specific learning event. Rather surprisingly, email-based exchanges are preferred by almost 2/3 of the respondents, whereas only 45% prefers attending the webinars.
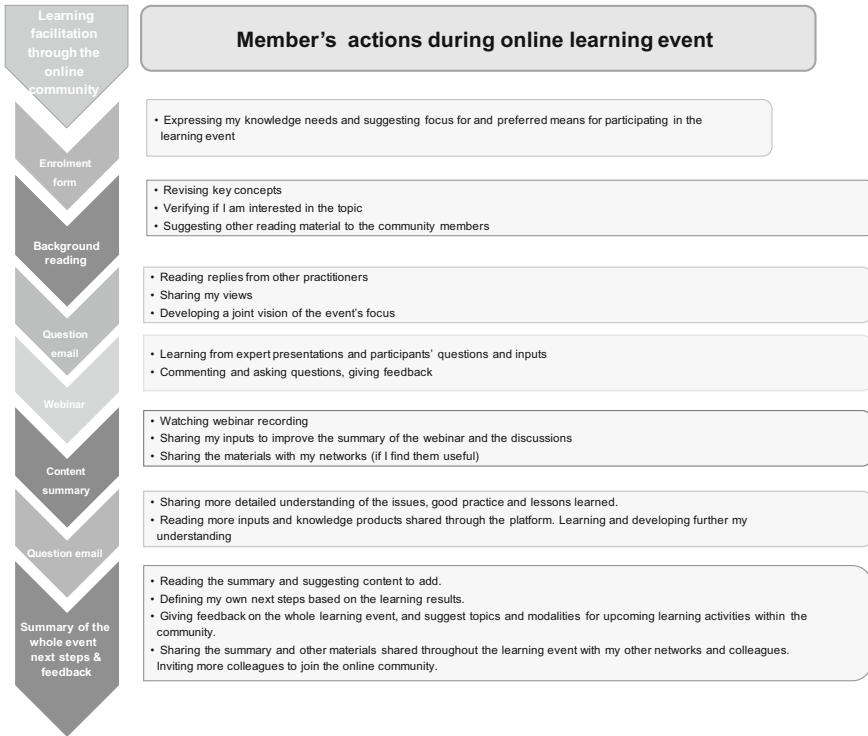
Fig. 1 Example of an online learning event's learning path from a members' perspective—an ideal case. *Source* Maria Nuutinen, FAO (2017)
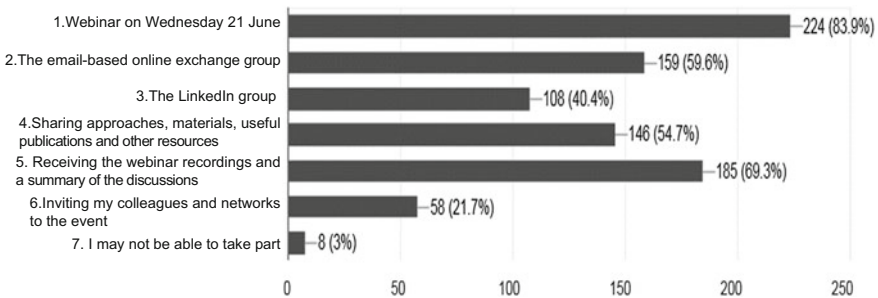

Fig. 2 Responses of community members regarding their preferred means of participation in an online learning event of the community of practice. Please note that the enrolled participants could pick several options. N = 267. *Data* Maria Nuutinen, FAO, collected through a Google form

Lack of time available is the most common limiting factor that the participants report through the feedback forms as reasons why they have not taken part in the event. Also, if the member feels that the content is not appropriate for his/her level

of expertise, the member will most likely stop following the exchanges related to the event. In some cases, very motivated members contribute in shifting the event's focus toward a topic that interests them more and suggest a new angle or more complex problematic to other participants. As an example, in the latest learning event on irrigation and climate-smart agriculture, most exchanges were sparked by member's question of potential maladaptation caused by irrigation.

Capacity Development

Capacity development can be defined in very many ways but has been mainstreamed in the international development agencies' work in the past decennia. Within FAO, the definition used is as "in international development, capacity is seen as "the ability of people, organizations and society as a whole to manage their affairs successfully" (FAO 2010: Corporate strategy on capacity development). For FAO's work as a United Nations organization, this capacity should help countries in achieving their development objectives, such as the Sustainable Development Goals as well as the national development plans. The Corporate strategy further defines:

> 'Capacity development' is the "process whereby people, organizations and society as a whole unleash, strengthen, create, adapt and maintain capacity over time". (…) It is a complex, non-linear and long-term change process in which no single factor (e.g. information, education and training, technical assistance, policy advice etc.) can by itself be an explanation for the development of capacity.
>
> FAO 2010

This definition matches well how the social learning through CoPs work with their focus on learning over a longer period of time, forming a part of the development of their environments, organizations and their individual skills, knowledge and ways of working.

Dimensions of Capacity Development

For learning and developing capacity, online communities are a tool with great potential to achieve benefits within the three dimensions of capacity development: the enabling environment, within organizations and individuals (FAO 2015). In terms of enabling environment, online communities can help in creating an enabling environment through engagement of large group of stakeholders who are working on similar subjects, for example agriculture sectors and climate change, and help in creating a beneficial environment for these capacities to develop, such as "capacities to formulate and implement policies and lead policy reform", as well as governance, and incentives (FAO 2010). At the organizational level, the CoPs can structure information, and function as part of the institutional memory, making key content accessible to new staff e.g. through the email-based fora's library

function. The individual level, all members can use the knowledge and information shared via the CoP to develop their understanding and capacity.

Means of Online Learning

Within the studied CoPs in FAO, online learning consists of:

1. email-based forum called "Dgroups" of the online communities of practice where any member can post questions, suggest discussion topics and other concerns (moderated) (Dgroups Foundation 2017);
2. webinar space (Adobe Connect) with expert presentations, polls, questions and answers sessions and collection of take-home messages and feedback;
3. Social media group on LinkedIn (see through: http://bit.ly/micca_linkedin)
4. facilitated and structured discussions through online fora (Dgroups and LinkedIn or partner's forum); and
5. sharing and receiving key knowledge materials in a variety of formats, such as e-learning courses, training guides or videos through online fora (ibid.).

Box: About Dgroups communities

Each community on the Dgroups platform (www.dgroups.org) is accessible with a password to people who have filled in the membership request form, and who have been approved. All messages sent to a community-specific email address are accessible to all members, after they have been moderated, like in any email-list. The messages sent to the Dgroup community, can also be delivered to members' mailboxes, at the frequency they wish to receive them. In addition to the message function, a Dgroups community shows in the same way as most online fora the list of members, discussion threads, a library, a calendar, and allows the moderators to use some community monitoring tools. The Dgroups platform itself is managed by an independent foundation through its steering committee.

For more information: www.dgroups.info/about-dgroups

All the online fora (1–5 listed above) are moderated and facilitated by FAO's facilitating team with occasional external professionals. As can be seen in the Fig. 2 from the enrolments of a learning event called "Irrigation in climate-smart agriculture—challenges and responses", which took place in June 2017, the biggest share of enrolled participants are especially interested in joining the webinars, receiving webinar summaries and recordings and participating in the e-mail-based facilitated discussions on the Dgroup forum.

The content of the tens of webinar sessions can be accessed through the FAO web site (See e.g. FAO 2012–2017 www.fao.org/in-action/micca/resources/learning) as well as the corporate YouTube channel.

FAO has used this method of combining various online for a and sources of information mainly for adult capacity development purposes in the agriculture, land use and forestry sectors in the developing countries. Making content available on

several ways allows accessing the information also with low-bandwidth internet connection and choosing between different ways of engagement. Students form a large share of the members, and frequently request support from other members for definition of their study topics, for collection of data or recommended literature. Given the age (over 5 years) of the communities of practice, some of the early members who joined the first community focusing on climate change mitigation in agriculture, might have followed the exchanges throughout their studies, and be now in the beginning of their professional career.

Senior-level members form an important part of the communities (based on the results of enrolment forms, and the LinkedIn group's monitoring data). They tend to share results of projects and advise less experienced members. Policy-makers and higher-level public officers tend to send thank you emails to the facilitators noting that the materials shared have been useful for them, but they do not necessarily email the communities directly. As the communities host also high number of people from different academia and research organizations, the members often benefit from messages about most recent study results. Altogether, this interconnectedness of different stakeholder groups has the potential to increase the quality of content, as well as the trust and appreciation between different groups. Based on exchanges with national focal points of a UNDP–FAO project focusing on integrating agriculture sectors into National Adaptation Plans (NAPs), difficulties in collaboration and coordination between different ministries, sectors as well as local, sub-national and national levels is often an important barrier to efficient climate change adaptation planning and budgeting (private exchanges during project's workshop, April 2016, FAO headquarters, Rome, Italy). Therefore, in the long-run, similar online communities that can allow for good exchanges and coordination, have the potential to improve the results of members' work at different levels.

Challenges of Online Communities

Using online communities of practice for transforming agriculture (or other sectors) in the changing climate is a rewarding but also a challenging task (see e.g. for: Tarzimi et al. 2006). Based on the FAO team's experience, there are three main challenges that communities face:

1. challenges of online environment for pedagogy and attention;
2. competing for members' time;
3. creating a shared understanding of complex concepts in a wide range of contexts; and
4. technical difficulties related to ease usability of online fora. (FAO 2016).

While the second and the third challenge impact the possibilities how the community's members can engage in learning activities, the challenge of creating a shared understanding of key concepts requires often more time and effort both from the participants as well as the facilitating team.

Challenge for Pedagogy and Attention

Webinars can be good means of conveying new information that does not necessarily require a lot of training to be integrated in the learners' day-to-day work. Participants can attend webinars from any device with a fairly good internet connection (512 Kbps for webinar attendees, wired connection is recommended in most cases, mobile data being too weak, see for: Adobe 2017), and organizers do not need to cover travel expenses. Compared to e-learning courses or Massive Open Online Courses (MOOC), webinars are a more agile tool: they can be prepared quicker, and they provide opportunities for synchronized exchanges between participants, therefore adding to the 'official' content shared by the organizers. In addition, content can be easily adapted to the rapidly evolving climate knowledge.

The FAO facilitating team records the webinars, and shares recordings e.g. via social media video sites, and communities, extending the amount of users that can benefit of their content. It is possible to monitor to some extend the participation to the webinar and participants' learning results, but in the end, it is up to the participant how much attention he/she is willing or able to give to the session.

As participants often attend webinars from their offices, or at least from their computers, it can be often observed that their attention drifts easily to emails or other tasks awaiting. As nor the speakers nor listeners are visible to others in most FAO webinars (in order to reduce the bandwidth required, that increases with video broadcast), there is less social pressure to attentively listen to the presenters compared to traditional seminars. In the analysed communities, learning through webinars is voluntary and no certificates are given to participants. The FAO team has experimented with various approaches detailed below possibilities to increase the attention given by the participants for improving learning results.

The FAO facilitating team has developed a participatory approach of organizing the learning events. It starts with the enrolment phase and its survey, allows collecting data on participants' capacity development and learning needs, wishes and questions, and combining them to the expert steering group's recommendations and vision, in order to cater focused, inspiring and useful content. To maintain attention, email messages as well as webinar presentations and speeches are kept to the point, short and engaging. The webinar sessions often include various polls and questions and answer sessions, as well as an opportunity to give feedback. These participatory sections have a true purpose (e.g. of collecting information on field experience, understanding members' views or recommendations, and combining the summaries of the event) and they rhythm the events and sessions on different fora.

Since 2015, the webinar organizers have also sought to further develop the learning path to improve the capacity development results. This has meant closer integration of email-based exchanges and webinars, as well as more structured webinars with interactive parts in webinars. The webinar facilitators have also asked participants to define their own learning objectives and requested at the end of the session and each learning event the participants to evaluate if they have reached their own objectives. Through these approaches the facilitators have noticed that the

amount of participants remaining in the webinars until their end and participating in the final polls has increased.

For assessing systematically learning results, the next step would be to test participants' knowledge in a more systematic manner, adding to the result of self-assessments.

Joint Definition of Concepts for Climate Literacy

Climate change impacts sectors directly depending on weather conditions and related natural resources. To be able to interpret climatic impacts and prepare for them, climate literacy should be urgently increased especially within actors in the agriculture sectors.

Communities of practice aim at supporting their members in developing climate literacy as part of its capacity development. Joining to the FAO-facilitated communities is free of charge. New members find the communities mostly through colleagues, social media and newsletters, that keep the flow of joining members constant. Online learning events increase the membership significantly. Moderators scan through the reasons the new members indicate for joining the email-based network or the community on social media. Most new members indicate that they are working or studying something related to the community's domain and wish to learn more. The members are not required to work or certificates of studies on climate change or agriculture, but because of the character of exchanges, people who are not engaged in this domain, will not remain in the fora for long.

Prior to start of learning events, the facilitators aim at sharing background information sources via email. These background materials, articles, videos, publications, often offer basic definitions of key terminology to be used and are chosen to cater relevant information to members with different levels of experience on the topic. In addition, the facilitators regularly forward to the list information of opportunities for strengthening understanding of the basis of climate or food security literacy, for example courses from World Bank's Open Learning Campus, or other MOOCs. The FAO facilitation team monitors frequently the activity of the communities, including expressed views and opinions in the emails, surveys and during webinars. The monitoring allows having a basic understanding of how members define and comprehend climate change as a phenomena, and what are the main challenges as well as the solutions they have identified to effectively adapt to and mitigate climate change.

As an example of joined concept definition within a community, during several events in 2014 and 2015, a large share of participating members wanted to spend considerable time to define the concept 'climate-smart agriculture'. During an event focusing on the implementation of the climate-smart approach at the field level, the facilitators suggested this definition to the concept, trying to summarize different aspects that members suggested, e.g. clearly articulating how agroecology and climate-smart agriculture are related to each other. The facilitators then drafted a

definition proposal that formed the basis for the following exchanges. In addition to offering additional information sources, the FAO-facilitators summarise regularly the discussions and main content of the learning events building the institutional memory and making the core knowledge exchanged and generated more easily available. Referring back to previous learning event recordings and summaries accessible through the various fora (Dgroups library and dissemination emails, web sites, social media) allows also new members to benefit of the previous events' results.

> I've been able to see the arguments of people coming from various perspectives and this has helped me to frame my perspectives which I have in turn used to influence my organisation at several levels.

> – Member of a FAO-facilitated community of practice to the project evaluators.

> (Swennhuis and McCaffrey 2016.)

In terms of climate literacy, the 17 online learning events and webinars have increased the practical understanding of the members, based on the received feedback, and what can be observed during the evolvement of exchanges. This understanding is not only about concrete ways how the climate change impacts their work and environment, but also their understanding of what and how they can adapt better to the changes and mitigate climate change.

In addition, based on members' feedback, peer support has empowered them. This strengthening of community members' agency is one of the main outcomes of the CoPs.

Skills Developed

Developing skills forms part of capacity development. In addition to technical skills and knowledge related to climate change and agriculture sectors, such as irrigation, conservation agriculture or agroforestry, the exchanges through the online community platforms develop other, more functional capacities, sometimes defined as 'soft skills', often vital for getting things done in the climate field. These skills and capacities can include: networking and partnering skills; helping groups to achieve their results, or 'facilitation' skills; ability to raise interest of other stakeholders on a particular issue; write engaging and concise text; train language skills (most of the exchanges in FAO-facilitated communities are held in English, Spanish or French); and create understanding of related fields. In the final evaluation of the MICCA project, members expressed their views on the main benefit and value of the community/communities of practice to them to the independent evaluators:

> I have benefited more from the links shared by colleagues than the discussions. Some of the links shared have been wonderful and have provided fresh insights for my work. I look forward to applying these in my work.

> MICCA is an ideal platform to share news, post, helps that are based on the common subject thematic.

Even I am not able to actively participate as much as I would like to, I enjoy reading the many relevant and inspiring comments. I find this approach more efficient, to get a little portion every day… I really enjoy being part of this community!

– Three members of FAO-facilitated communities of practice.

(Swennhuis and McCaffrey 2016.)

Regarding the learning processes, the evaluators concluded that: "for many, the primary value of the CoP discussions are in the information shared." (Swennhuis and McCaffrey 2016).

As an example of learning on subjects outside the previous area of expertise, for the community of practice on Agriculture sectors and climate change, consisting of over 3700 practitioners, students, members of academia, policy makers and private sector (data from August 2017), the learning events focusing on policies have often been most challenging, as only a minority of the members work with policy processes (as can be seen in the Fig. 3). Still, the members of the community of practice have underlined that it is useful for them to get to know the policy area that influences their work often in a very direct manner.

F. Background: I am already involved in activities related to rural advisory services and/or climate change and agriculture sectors through...

314 responses
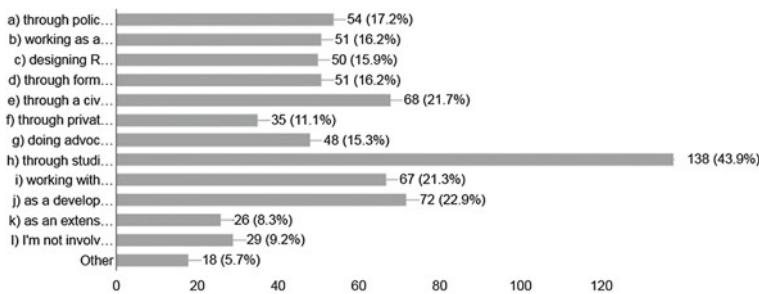
Legend:
a) through policy processes, e.g. planning and budgeting for Rural Advisory Services (RAS)
b) working as a civil servant
c) designing RAS and training extension agents
d) through formulation of national climate plans and actions (e.g. National Adaptation Plans, NAPs, or Nationally Appropriate Mitigation Actions, NAMAs)
e) through a civil society organization
f) through private sector activities, e.g. providing RAS services
g) doing advocacy or communications
h) through studies or research activities
i) working with an intergovernmental organization
j) as a development practitioner working on RAS and/or climate change
k) as an extension service agent
l) I'm not involved yet

Fig. 3 Only 17% of 314 enrolled participants to the webinar enabling advisory services for climate-smart agriculture were working on policies. N = 314. *Note* Participants could choose several options. *Source* Enrolment form: webinar "Enabling advisory services for climate-smart agriculture" FAO (2017). *Data* Maria Nuutinen, FAO, collected using Google Forms

Facilitation Components

The importance of organic, fostering and sensitive facilitation is often highlighted over technological concerns (see e.g. Hearn and White 2009). Facilitator and moderator have complementary roles in helping the members of the community of practice in reaching their goals. Figure 4 describes the differences as identified by the FAO team working with the communities, and lists common tasks performed by the two. Sometimes one person can play the two roles.

Facilitator's questions can help participants and the community as a whole to reach their learning objectives. These facilitating questions (see for more, e.g. in FAO 2016, pp. 21–30) do in best cases take the participant through a learning path, and at the end, he/she has defined how to use the lessons learned in practical action.

Technical Components

In the agriculture sectors especially, the challenge of providing easily accessible and relevant climate-related information tailored for different stakeholders is staggering. In addition to the fact that farmers, herders, foresters and fishers, and people working on the value chains, are so geographically dispersed compared to practitioners in cites makes the task even more challenging. Yet, they are the ones needing the climate-related information the most. The main target audience of the studied communities are the people planning development work, and working with thein the development context to support them with this task of addressing climate change and food security together.

MODERATOR	FACILITATOR
Guides and helps members in the usage of the forum/fora, the netiquette and with the rules of engagement	Provides equal opportunities for members to share their different viewpoints to be shared
Manages the membership	Observes the content, style and rhythm of the interactions
Manages the settings of the forum as needed	Must be familiar with the topic (knowledgeable with current issues, interventions and research) and the types of actors engaged
Maintains a rhythm of activities: e.g. approves messages to the email list 2–3 times a day on working days	Takes a proactive role in taking the discussion forward
Monitors and reports on the development of membership and activities	Continually assesses: what is needed now? What is the atmosphere in the community?
	Thinks: what question would spur ideas sharing? Is there a member whose involvement would be especially useful at this point?
	Contacts members and request inputs or consultations

Fig. 4 Differences between moderator's and facilitator's tasks in FAO online communities of practice. *Source* In FAO (2016), Maria Nuutinen

There are specific benefits and challenges in the use of Information and Communication Technologies (ICT)—especially when considering how to reach different geographically dispersed groups. To those who can connect to internet, social media channels, a webinar or an email list, the online channels can deliver relevant knowledge faster than a publication. Still, online exchanges have their limitations, and means to structure visually the exchanges in a comprehensible manner should be developed further, especially to allow all stakeholder groups' engagement. Making online fora more user-friendly, through allowing for the visual structuring of exchanges (e.g. through tagging with key words, and powerful search engines within the fora, would be essential for helping CoP members to find the relevant information.

Though internet connection issues have hugely improved, with the 67% of the youth (15–24) is using internet in developing countries and 30% in least developed countries (see for: ITU 2017; in comparison to: World Economic Forum 2015; UN News Centre 2015), since the start of the work in 2012 still approximately 2% of participants e.g. to webinar sessions report that they either can assist fully in the session. In the developing country context, the email-based exchanges of the communities that can be accessed also through simple cell phones with mobile data connection, can help in reaching and engaging some of the less connected regions—and potentially more climate-vulnerable benefiters. ITU reports (2017) that the mobile-broadband subscriptions have increased in least-developed countries by over 50% between 2012 and 2017, though still only a bit more than 20% of inhabitants have a mobile-broadband subscription. In all developing countries combined, approximately 50 out of 100 inhabitants have a mobile-broadband subscription in 2017 (estimates, ITU 2017). An important digital gender gap exists globally (ITU 2017), and is also reflected in the FAO-facilitated communities participation rates: in general terms, female participants form approximately 40% of the participants.

Technical content of the FAO online learning events depends on the involvement of experts. In best cases, the experts have engaged in three ways: first, advising in the focus of the whole learning event, secondly in giving webinar presentations and finally in replying other members' questions both during the webinars and through the email-based discussions. The facilitator of the event needs to keep in mind the different levels of knowledge and experience that the members have, and keep the exchanges both comprehensible and interesting to most members.

Monitoring and Improving

Social media and online learning platforms, such as Moodle, give efficient tools to structure the learning path and monitor learners' activities and contributions. For documenting and showcasing communities' impact and efficiency, our team has used monitoring tools both for the accessing online documents, sites and fora. Additionally, the focus and the quantity of the participants' inputs can be monitored through platforms' key word search, and seeing which discussion topics and questions have sparked most replies with more content suggestions and advise. One challenge is to decide which things to monitor, how often, and what not, as the

activity of the communities is sometimes intense, and monitoring should not be the main focus of the moderator. The FAO guidebook gives suggestions on where to focus in the chapter Monitoring, evaluation and reporting on communities of practice (FAO 2016).

Elements for Further Development

Integration of Existing Communities and Online Courses

To FAO team's experience during e-learning courses and MOOCs, the social aspect that makes people engage in processes more fully, are often very limited. Platform developers have made attempts to bring in more social engagement features, such as group discussion or tasks, but at the same time it cannot be expected that participants would develop strong social relations with people they engage with for some weeks only (see for sites of MOOC providers, such as edX; Coursera, World Bank). Given that learning is in most cases a social process (for more on social systems on learning: Wenger 2012), it could be beneficial to test further integration of existing communities of practice and more structured learning courses. For organizers of these learning opportunities, the curricula design might require more flexibility and collaboration with facilitators together with pedagogues.

Development of Online Platforms and Structuring Information

The content shared on online communities is often hard to search. Summaries of discussions, learning events and webinars are an important step in making the main content easily available, but often the exchanges still reflect the real-life communications in its fragmented nature. Online platforms have possibilities to develop further to better highlight the main content exchanged in different groups.

Results and Conclusions

According to the experiences gathered as part of the project, the main elements to achieve good learning results that satisfy members of the online communities and address challenges are:

1. dedication of sufficient human and financial resources allocated to support the facilitation and moderation of the communities and the organization of learning events;

2. clearly defining the key concepts at hand, the focus and domain of the community with its members;
3. choosing easy-to-use online forum (that the members and target audience for new members is using already or can learn to use) or fora
4. taking into consideration the objectives and the needs of the target audience; and
5. engaging topical experts (e.g. leading professionals in partner organizations, researchers willing to share their results) to actively contribute to the community's exchanges.

These element cater for developing capacity at different levels, ensuring that the maintenance and facilitation as well as technical content and ICT solutions are accessible.

To conclude, there is a growing interest towards using online communities of practice for finding solutions to climate-related challenges, and this should be encouraged. The facilitator has a fundamental role in balancing between participatory approach and actions, which focus exchanges toward topics that really matter.

To develop further the online communities as social learning systems, it would be recommended to find ways to integrate e-learning opportunities, such as MOOCs and online communities of practice. As a second, additional way ahead, interlinking the ecosystems of different online communities more effectively would be beneficial in solving multidisciplinary issues, such as climate change. In addition, online platform developers should aim at more developed ways to showcase better the main content developed and shared within online communities in a structured and concise manner. The improved social learning systems could help ensuring that information and knowledge were increasingly benefitting not only the community members, but through their work, societies and the global community as a whole.

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